Remedial Site Optimization for the BB&S Treated Lumber Corporation Site NYSDEC Site No. 152123 Southampton, New York

May 2017

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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List of Abbreviations and Acronyms

AROD	Amended Record of Decision
BB&S	Best Building and Supply
BTOIC	below the top of the inner well casing
CCA	chromated copper arsenate
CSM	Conceptual Site Model
COC	contaminant of concern
DER	Division of Environmental Remediation
EEEPC	Ecology and Environment Engineering, P.C.
EC	engineering control
FS	Feasibility Study
IC	institutional controls
ITRC	Interstate Technology & Regulatory Council
LTM	long-term monitoring
MPI	Malcolm Pirnie, Inc.
NYCRR	New York State Codes, Rules and Regulations
NYSDEC	New York Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	operations, maintenance, and monitoring
PDI	Pre-Design Investigation
ppb	parts per billion (microgram per liter)
ppm	parts per million (milligrams per liter)
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
RSO	Remedial Site Optimization
SCDHS	Suffolk County Department of Health Services
SCG	standards, criteria and guidance

List of Abbreviations and Acronyms (cont.)

SCO	soil cleanup objective
SCWA	Suffolk County Water Authority
Site	BB&S Treated Lumber Corporation Site
SMP	Site Management Plan
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Executive Summary

This Remedial Site Optimization (RSO) report was prepared by Ecology and Environment Engineering, P.C. (EEEPC) at the request of the New York State Department of Environmental Conservation (NYSDEC) to evaluate alternatives to the existing operations, maintenance and monitoring (OM&M) at the Best Building and Supply (BB&S) Treated Lumber Corporation State Superfund Site (the Site), NYSDEC Site No. 152123. According to the Interstate Technology & Regulatory Council (ITRC), RSO is the "systematic evaluation and enhancement of site remediation processes to ensure that health and the environment are being protected over the long term at minimum risk and cost" (ITRC 2004). This RSO is designed to reduce the risk of further contamination and reduce the total cost of OM&M, which provides documentation of any risks present at the Site.

The Site Management Plan (SMP; EEEPC 2014a) outlines the current OM&M at the Site, which includes annual sampling of all active wells on the BB&S property. Given that the detected levels of contaminants of concern (COCs) in many of these wells have frequently been below the Site's screening criteria or non-detect, OM&M can be optimized by decreasing the sampling frequency for those wells. In addition, wells that are frequently found to be dry or that cannot otherwise be sampled can be decommissioned and, as appropriate, replaced with a new well as part of the RSO.

According to NYSDEC's RSO guidance, an RSO plan may include a critique of the conceptual site model (CSM), recommendations to improve a selected remedy, or identification of a better remedy that was not available at the time of the Record of Decision (ROD) (NYSDEC 2000). In the case of the BB&S Site, this RSO report suggests improvements to the selected remedy in the form of OM&M. The CSM was developed from elements presented in the Remedial Investigation (RI) and Supplemental Pre-Design Investigation (PDI) and updated with information from approximately 5 years of OM&M at the Site after implementation of the Site remedy. The locations of the initial sources of contamination, a cracked sump and leakage of chromated copper arsenate (CCA) in the drip pad and storage areas, remain on site. However, the surrounding contaminated soils were removed as part of the remedy in 2011. Remaining contamination under the building is isolated through engineering controls (i.e., sealants on building floors and a high-density polyethylene skirt around the remaining buildings) that divert runoff away from the contaminated soils beneath the buildings. During the monitoring program, the COCs on-site—arsenic, total chromium, and hexavalent chromium—have been detected consistently at decreasing or stable concentrations in some wells and rarely detected at all in other wells. In addition, these COCs have rarely been detected in sediment, surface water, and groundwater-derived potable water, with few exceedances of screening values. As a result, the monitoring frequency was changed from bi-annual to annual after four years of monitoring. This RSO discusses the possibility of further decreasing the groundwater sampling frequency and improving the monitoring well network.

Four alternatives are presented in this RSO, each of which includes continuation of the annual monitoring program for sediment, surface water, and groundwater-derived potable water:

- continuation of the existing annual monitoring program;
- continuation of the existing annual monitoring program with alterations to the existing well network;
- continuation of annual monitoring for on-site wells and wells that have levels of COCs above the screening criteria, and triennial monitoring for all other wells; and
- continuation of annual monitoring for on-site wells and wells that have levels of COCs above the screening criteria, triennial monitoring for all other wells, and alterations to the existing well network.

The wells proposed for decommissioning and/or replacement are BB&S-1 and MW-5. The latter well has been found to be dry since Monitoring Event 2 in December 2012 and presents a risk for introduction of surface contaminants into the groundwater if left in place, as it provides a direct pathway from the ground surface to the groundwater. Because this well is located in an area densely populated with monitoring wells of various depths, it does not need to be replaced. BB&S-1 is a discovered well located at the easternmost extent of the Site, a valuable location for information on the extent and spread of contamination. BB&S-1 has presented issues with obstructions and turbidity during four monitoring events, which prevented samples from being collected during two events. The RSO recommends its replacement with a nested well to obtain contaminant information at various depths. The preferred alternatives incorporate these well removals to prevent the movement of contamination from the surface to groundwater and to obtain more information on the contaminant plume.

All monitoring events provide information consistent with the results of previous monitoring events, showing decreases in contaminant concentrations or generally stable contaminant concentrations. Given this consistency, it is prudent to decrease the groundwater sampling frequency in order to reduce costs. Therefore, EEEPC recommends decreasing the sampling frequency of wells exhibiting non-detectable levels of COCs to triennial sampling and to decommission wells BB&S-1 and MW-5, replacing BB&S-1 with a nested well. This alternative provides cost savings in addition to improving the monitoring well network.

1 Introduction and Background

The New York State Department of Environmental Conservation (NYSDEC) contracted Ecology and Environment Engineering, P.C. (EEEPC) to prepare a remedial site optimization (RSO) as part of operations, maintenance, and monitoring (OM&M) for the Best Building and Supply (BB&S) Treated Lumber Corporation State Superfund Site (the Site), NYSDEC Site No. 152123. This report presents the RSO options developed by EEEPC for optimization of post-remediation operations at the Site. This RSO was prepared by EEEPC for NYSDEC under Work Assignment D007617-06.2, which was approved by NYSDEC's Division of Environmental Remediation (DER) on May 27, 2015.

1.1 Site Description and Background

The Site is located on approximately 17 acres at 1348 Speonk-Riverhead Road in the hamlet of Speonk, town of Southampton, in Suffolk County, New York (see Figure 1-1). A lumberyard for wholesale and retail lumber distribution (BB&S) formerly occupied the Site, but ceased operations in 2009 after filing for Chapter 11 Bankruptcy. The most recent use of the site was as a parking area for tractor-trailers before site remediation began in 2011.

The Site includes several buildings located in a horizontal line directly east of and parallel to Speonk-Riverhead Road. Behind these buildings is a metal building, formerly used for material storage. On-site surface runoff is conveyed through culvert piping and catch basins, which discharge into an off-site culvert on the west side of Speonk-Riverhead Road, which, in turn, discharges into a drainage swale that extends to the west from the road (see Figure 1-2).

The Site is located within the Central Pine Barrens Preserve on Long Island. This is a rural area with some homes and businesses located within a half-mile of the site, including south of the site in the general direction of groundwater flow. In June 2001, the Suffolk County Water Authority (SCWA) installed a public water line along Old County Road and Speonk-Riverhead Road to provide water to residents downgradient of the Site. This water line was expanded to include some residents along Fifth Avenue, which parallels Speonk-Riverhead Road (NYSDEC 2009a).

An expanded site description and summary of historical activities at the Site is presented as part of the revised Site Management Plan (SMP) previously prepared by EEEPC to manage engineering controls for wastes that remain at the site (EEEPC 2014a).

1.2 Remedial History

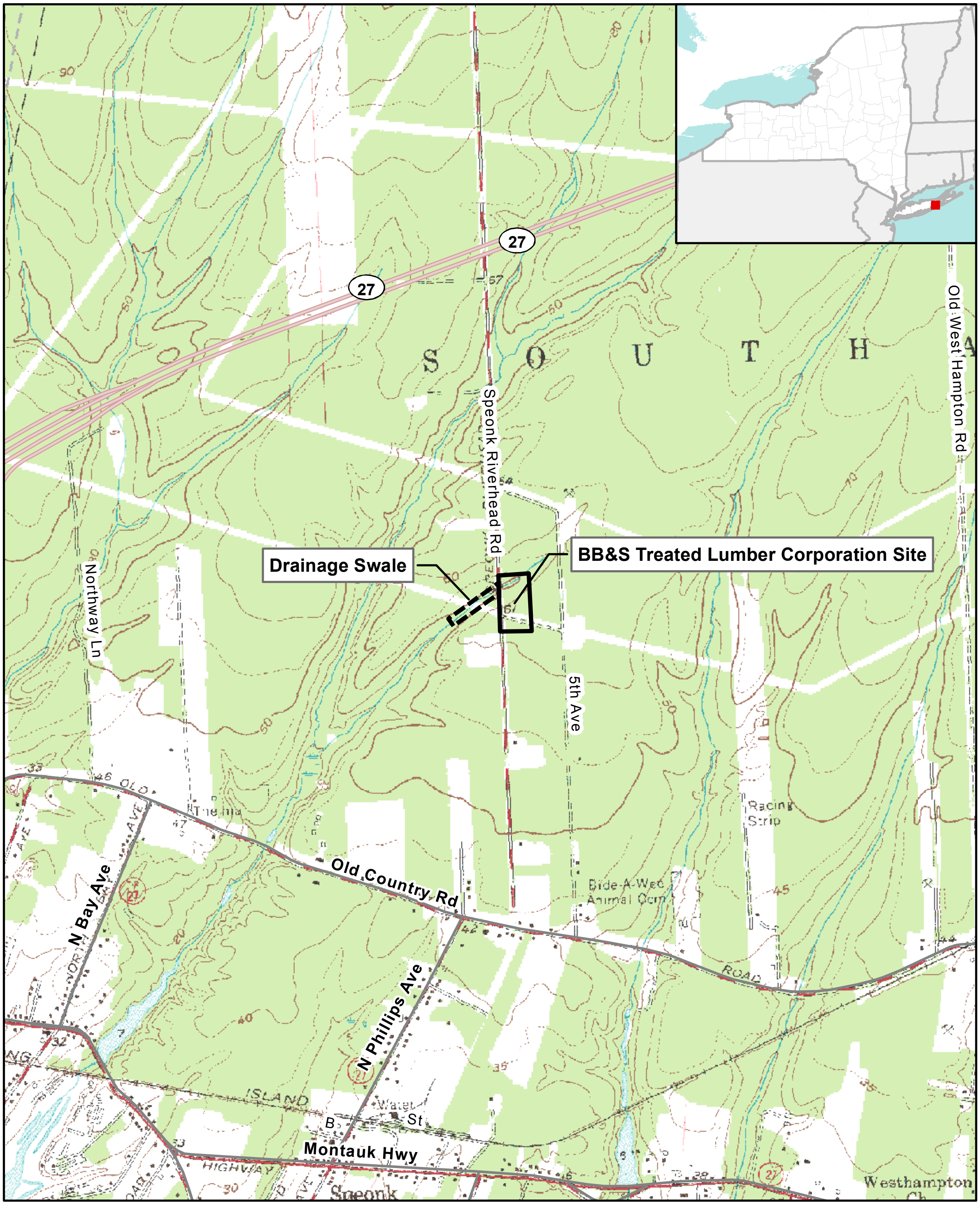
During its operation, BB&S used chromated copper arsenate (CCA) to treat the lumber. CCA is listed by 6 New York State Codes, Rules and Regulations (NYCRR) Part 371 to be a hazardous waste (waste code F035) when spent or disposed of without treatment. The Site was placed on the New York State Registry of Inactive Hazardous Waste Disposal Sites in 1993 based on the results of a Remedial Investigation (RI) performed by Malcolm Pirnie, Inc. (MPI 1998). Based on the results of the RI, MPI completed a feasibility study (FS) of the site (MPI 1999). According to the 1999 FS, CCA was released to the environment through surface spills and sump leakage at the site. The original Record of Decision (ROD) for the site was issued on February 25, 2000 (NYSDEC 2000).

A pre-design investigation (PDI) performed by Earth Tech Northeast, Inc., from September 2005 to February 2006 indicated that the CCA contaminant plume had attenuated since the issuance of the ROD, and the volume of CCA-contaminated soil requiring remediation had increased. Supplemental PDI and FS reports from 2009 recommended replacement of the pump-and-treat system operated by BB&S from 1987 to 1996 (inoperable since 1996) with a long-term groundwater monitoring plan (AECOM 2009a; AECOM 2009b). As a result, NYSDEC issued an Amended ROD (AROD) on October 27, 2009 (NYSDEC 2009a), that made the following changes to the ROD:

- Eliminated the groundwater extraction and treatment system;
- Increased the soil volume requiring remediation;
- Provided an alternative water source to residents along Fifth Avenue (as mentioned in Section 1.1);
- Eliminated the on-site soil remediation treatment in exchange for excavation, transport, and disposal of on-site and off-site contaminated soil; and
- Installed additional off-site groundwater monitoring wells.

The remediation activities described in the AROD began under contract to EQ Northeast, Inc., in September 2010 and were completed in October 2011. Due to presence of residual contamination on-site (e.g., in soil beneath the former Drip Pad and CCA Treatment Buildings), institutional controls (ICs) and engineering controls (ECs) were put in place, and related monitoring activities were included in the SMP (EEEPC 2014a).

Path: L:\Buffalo\BBS_Treated_Lumber\Maps\MXD\MiscRequests\USGS_Topo.mxd



▭ BB&S Treated Lumber Site

⬚ Drainage Swale

Secondary Road

Local Road

Figure 1-1

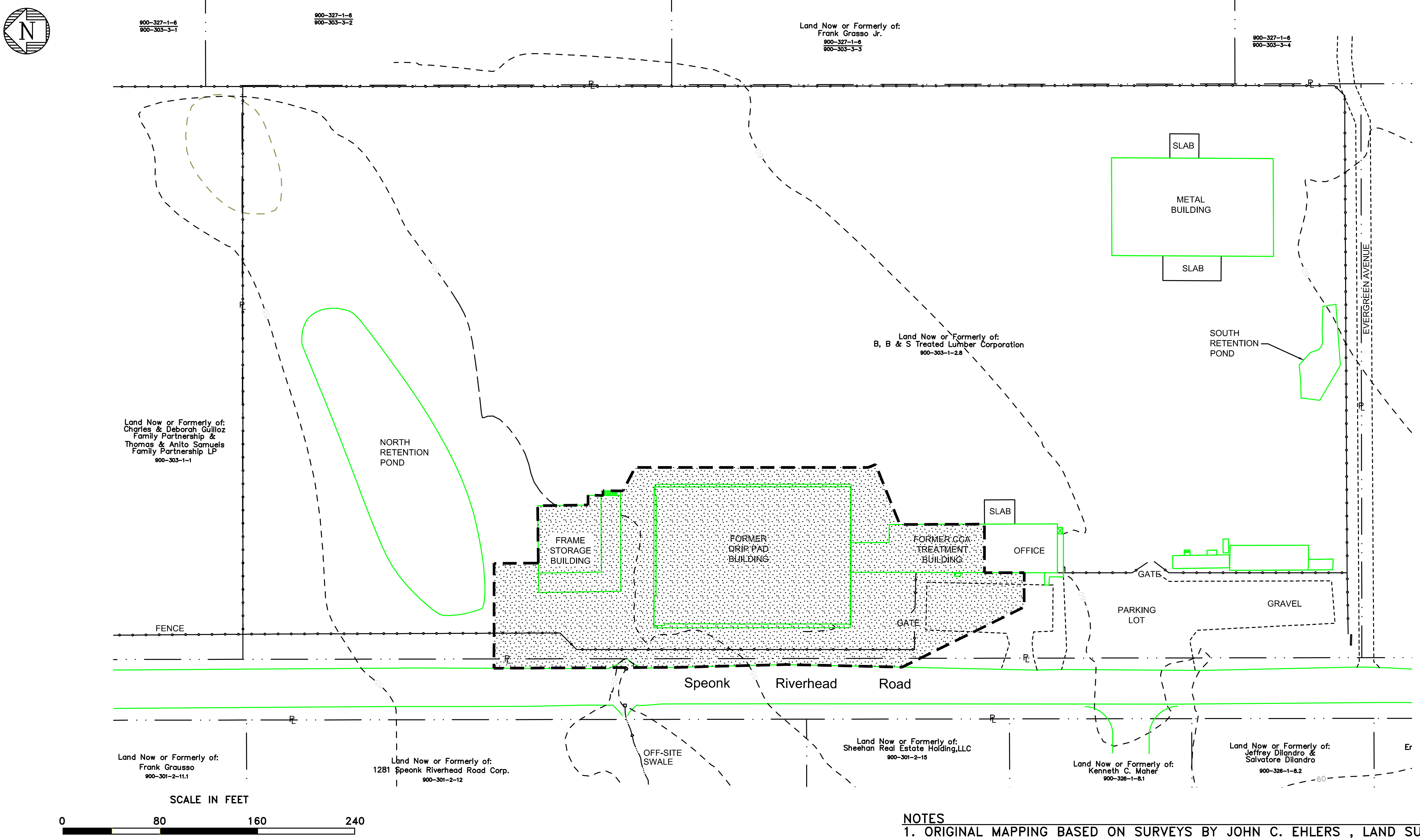
Site Location Map

BB&S Treated Lumber Corporation Site

Suffolk County, New York

NYSDEC Site # 152123

F:\BB+S\Sampling location figure\Figure 1-2 – SITE MAP.dwg



LEGEND

- ROAD
- APPROXIMATE PROPERTY BOUNDARY
- FENCE LINE
- TOPOGRAPHIC SURFACE CONTOUR (1 FT.)
- HAZARDOUS WASTE BOUNDARY AREA

NOTES

1. ORIGINAL MAPPING BASED ON SURVEYS BY JOHN C. EHLERS , LAND SURVEYOR, 6 MAIN STREET RIVERHEAD, NY 11901 AND WENDEL SURVEYORS, 7405 CANAL ROAD LOCKPORT, NY 14095. ADDITIONAL INFORMATION WAS ADDED BY AECOM FROM FIELD SURVEY AND OBSERVATIONS. CAD FILE 97347-DESIGN-R1.DWG WAS PROVIDED BY AECOM (OCTOBER 2009) AND IS THE DRAWING USED TO CREATE THIS FIGURE.
2. VERTICAL DATUM: NAVD 1988
   HORIZONTAL DATUM: NAD 1927

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FIGURE 1–2

SITE LAYOUT MAP
BB&S TREATED LUMBER CORPORATION SITE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NY

The remedial action objectives (RAOs) associated with this project are as follows:

- Eliminate, to the extent practicable, the ingestion of groundwater affected by the site that does not meet New York State Department of Health (NYSDOH) Part 5 Drinking Water Standards.
- Eliminate, to the extent practicable, exposures of site workers to shallow contaminated soil on the site.
- Eliminate, to the extent practicable, exposures of the public to shallow contaminated soil on and off the site.
- Eliminate, to the extent practicable, the exposure of wildlife to shallow contaminated soil on and off the site.

Following the completion of remediation activities in 2011, semi-annual monitoring was performed in March, April, and June 2012 and December 2012; April, May, and June 2013, and November and December 2013; April and May 2014, and November 2014-January 2015; and May and June 2015. Annual monitoring began in November and December 2016. The analytical results for the eight monitoring events (Monitoring Events 1-8) showed a general decrease in concentrations of contaminants of concern (COCs; arsenic, total chromium, and hexavalent chromium); however, the analytical results for a few sampling locations exceeded the standards, criteria, and guidance (SCG) values or soil cleanup objectives (SCOs) for the Site, as listed in Table 1-1. These trends are discussed further in Section 2.2.

Table 1-1 SCGs and SCOs for BB&S Site Contaminants of Concern

Contaminant of Concern	Groundwater SCG (ppb)^1	Surface Water SCG (ppb)^1	On-site Soil/Sediments SCO (ppm)^2
Hexavalent Chromium	50	11	19
Arsenic	25	50	16
Total Chromium	50	50	50

Sources: ^{1}NYSDEC 1998, ^{2}2010a

Key:

ppb	=	parts per billion
ppm	=	parts per million
SCO	=	soil cleanup objective
SCG	=	standards, criteria, and guidance

1.3 Objectives of This RSO

This RSO report evaluates the feasibility of alternatives consisting of reductions in sampling frequency and minor alterations to the monitoring well network. Each alternative is evaluated with regard to implementability, effectiveness, sustainability, and cost. Costs are estimated using present worth analysis, which is a necessary component of advancing an optimization with recommendation for

NYSDEC consideration. Due to the uncertainty in cleanup timeframes, present worth analyses are based on a period of 30 years. Present worth analyses aid in comparing upfront capital investments versus recurring costs.

1.4 Hydrogeology

The Site is located in a largely rural area with some residential and commercial development. The Site is underlain by the Upper Glacial Aquifer, a highly transmissive sand and gravel formation underlying the region to a depth of approximately 170 feet. Recharge to this aquifer occurs primarily from infiltration of precipitation. Groundwater in the Upper Glacial Aquifer at the BB&S Site has been shown to flow in a general southerly direction with some small-scale, localized variation (Earth Tech Northeast, Inc. 2007).

During all semi-annual monitoring events, well survey results were used in conjunction with static water level measurements to determine groundwater elevations. Each well is screened in the Upper Glacial Aquifer, and the vertical groundwater gradient appears to be negligible, with a slight downward gradient observed in Monitoring Events 1-3 and a very slight upward gradient observed between wells MW-18D and MW-18S during Monitoring Events 4-7. This indicates that flow is primarily horizontal throughout this aquifer. The software package Surfer® was used to interpolate groundwater elevation contours using the Kriging method. Figures 1-3 through 1-5 present the interpreted elevation contours for the shallow, intermediate, and deep monitoring wells, respectively. The groundwater flow direction was found to be predominantly to the south during all monitoring events. This is consistent with the findings of the PDI Report (Earth Tech Northeast, Inc. 2007) and with the United States Geological Survey regional model discussed in that report. However, it should be noted that the arrangement of the monitoring wells is linear with a north-south orientation, and this may prevent detection of slight flow direction variations (e.g., to the south-southeast or south-southwest).

Hydropunch® samples were collected west of the site, across Speonk-Riverhead Road, from October 24 to November 5, 1997, as part of the RI (MPI 1998). No COCs were detected in any of these samples, indicating that contamination had not migrated west of the site. In addition, potable water samples were collected bi-annually east of the site, along Fifth Avenue, from 2012 to 2014 in accordance with the approved SMP (EEEPC 2014a). No contaminants of concern were detected in these samples, indicating that contamination had not migrated east of the site. These findings indicate that groundwater flow and contaminant migration from the site is directed to the south.

During all monitoring events, the magnitude of the horizontal hydraulic gradient was greater off-site at the south end of the study area than on-site. The average hydraulic gradient across the plume was determined to be 0.25% for Monitoring Events 1-3, 0.14-0.15% for Monitoring Event 4, 0.20% for Monitoring Event 5, and 0.17% for Monitoring Events 6, 7, and 8.

F:\BB&S\Aerial Figure\GW contours\2-23-17\Groundwater contour figure_shallow 1-3.dwg

LEGEND:

⊕	MONITORING WELL LOCATION
—	GROUNDWATER ELEVATION CONTOUR IN FEET
17.56	GROUNDWATER ELEVATION IN FEET
➡	GROUNDWATER FLOW DIRECTION
NM	NOT MEASURED
▬	BB&S TREATED LUMBER SITE

NOTES:

1. AERIAL PHOTOGRAPHY WAS OBTAINED FROM THE NEW YORK STATE OFFICE OF CYBER SECURITY. THE FLYOVER WAS COMPLETED IN 2010. (SUFFOLK COUNTY ORTHO–IMAGERY 4BAND6inch).

2. DEPTH TO WATER MEASUREMENTS OBTAINED BY EEEPC AND ENVIRONMENTAL ASSESSMENT & REMEDIATIONS ON NOV 28, NOV 29, NOV 30, DEC 2, DEC 7, DEC 8, DEC 9, DEC 14, DEC 15, DEC 16, DEC 19, DEC 20 AND DEC 21 (2016).

APPROXIMATE SCALE IN FEET

0 600 1200 1800

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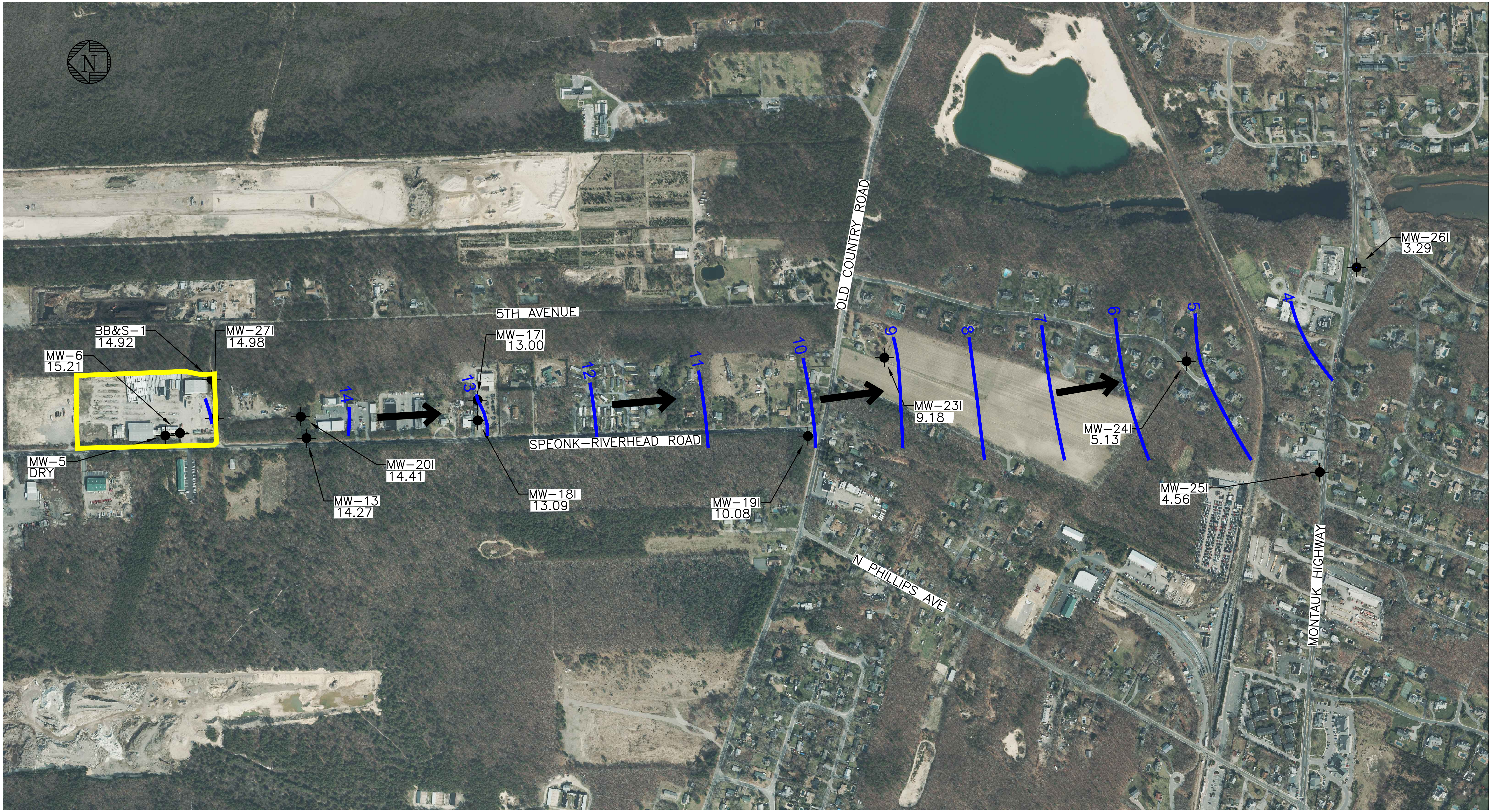
FIGURE 1–3 SHALLOW GROUNDWATER CONTOUR MAP (NOV–DEC 2016)
BB&S TREATED LUMBER CORPORATION SITE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NY



LEGEND:

●	MONITORING WELL LOCATION
19	GROUNDWATER ELEVATION CONTOUR IN FEET
15.39	GROUNDWATER ELEVATION IN FEET
➡	GROUNDWATER FLOW DIRECTION
NM	NOT MEASURED
🟨	BB&S TREATED LUMBER SITE

NOTES:

1. AERIAL PHOTOGRAPHY WAS OBTAINED FROM THE NEW YORK STATE OFFICE OF CYBER SECURITY. THE FLYOVER WAS COMPLETED IN 2010. (SUFFOLK COUNTY ORTHO-IMAGERY 4BAND6inch).
2. DEPTH TO WATER MEASUREMENTS OBTAINED BY EEEPC AND ENVIRONMENTAL ASSESSMENT & REMEDIATIONS ON NOV 29, DEC 2, DEC 5, DEC 9, DEC 13, DEC 15, DEC 16, DEC 19, DEC 20 AND DEC 21 (2016).

APPROXIMATE
SCALE IN FEET
0 600 1200 1800

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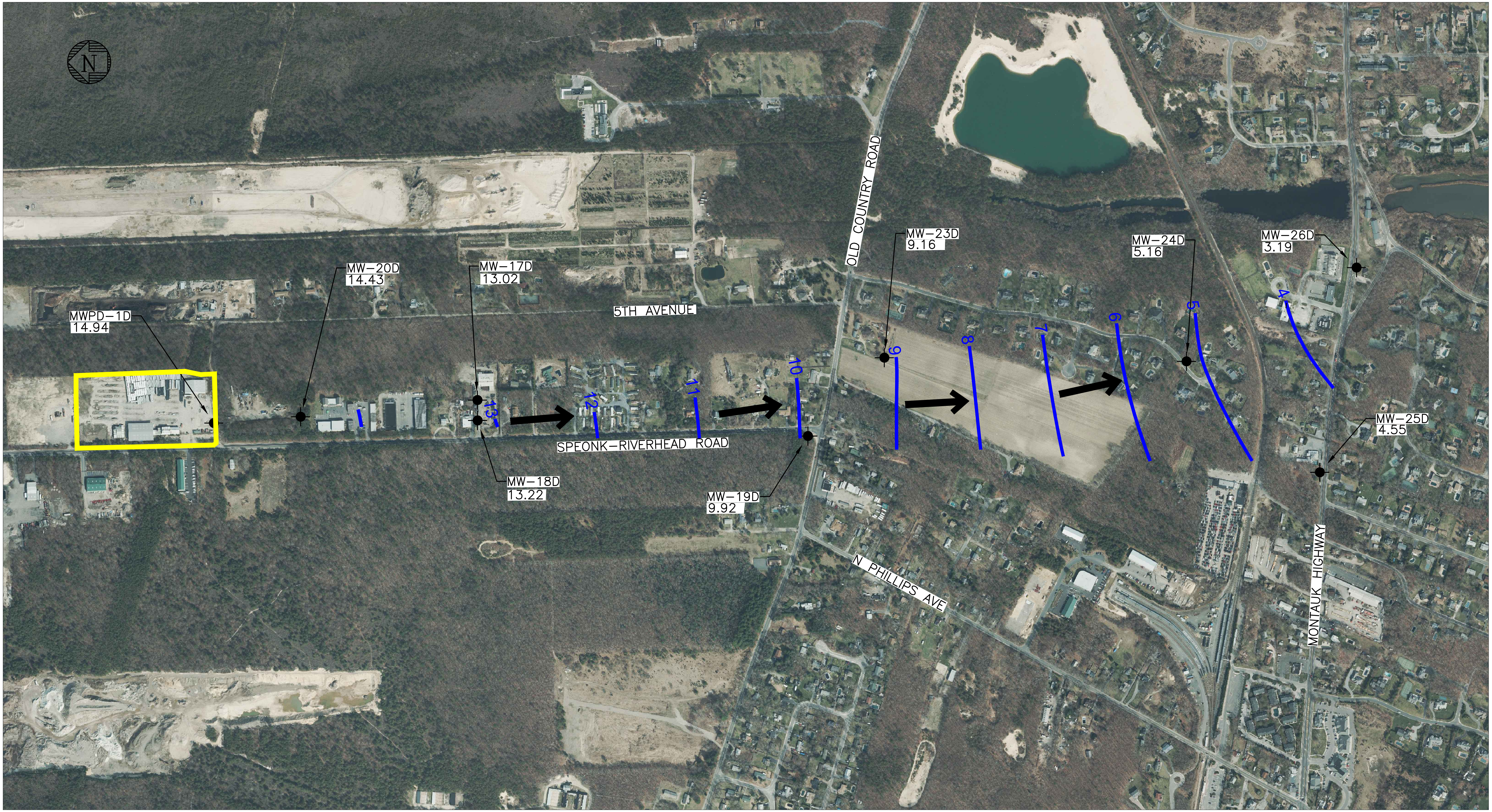
FIGURE 1-4 INTERMEDIATE GROUNDWATER CONTOUR MAP (NOV-DEC 2016)
BB&S TREATED LUMBER CORPORATION SITE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NY

F:\BB&S\Aerial Figure\GW contours\2-23-17\Groundwater contour figure_deep 1-5.dwg



LEGEND:

⊕	MONITORING WELL LOCATION
19 —	GROUNDWATER ELEVATION CONTOUR IN FEET
14.13	GROUNDWATER ELEVATION IN FEET
➡	GROUNDWATER FLOW DIRECTION
NM	NOT MEASURED
▬	BB&S TREATED LUMBER CORPORATION SITE

NOTES:

1. AERIAL PHOTOGRAPHY WAS OBTAINED FROM THE NEW YORK STATE OFFICE OF CYBER SECURITY. THE FLYOVER WAS COMPLETED IN 2010. (SUFFOLK COUNTY ORTHO-IMAGERY 4BAND6inch).
2. DEPTH TO WATER MEASUREMENTS OBTAINED BY EEEPC AND ENVIRONMENTAL ASSESSMENT & REMEDIATIONS ON NOV 30, DEC 5, DEC 12, DEC 14, DEC 15, DEC 16, DEC 19, DEC 20 AND DEC 21 (2016).

APPROXIMATE
SCALE IN FEET
0 600 1200 1800

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FIGURE 1-5 DEEP GROUNDWATER CONTOUR MAP (NOV-DEC 2016)
BB&S TREATED LUMBER CORPORATION SITE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NY

1.5 Conceptual Site Model

A conceptual site model (CSM) is a written or pictorial representation of an environmental system and the biological, physical, and chemical processes that determine the transport of contaminants from sources through the environmental media to environmental receptors within the system (ASTM 2014). In addition, the CSM incorporates existing geologic conditions and land use. The RI and Supplemental PDI previously presented the elements of the CSM, including: (1) potential sources of contamination, (2) types of contaminants and affected media, (3) release mechanisms and potential contaminant pathways, and (4) actual/potential human and environmental receptors.

A CSM is meant to be periodically reviewed and updated as more site data become available. Long-term monitoring (LTM) at the site provided additional information with which to refine the BB&S CSM.

1.5.1 Potential Sources of Contamination

Potential sources of contamination were identified in the RI and included a cracked sump, the concrete drip pad area, and the treated lumber storage area (MPI 1998). The buildings and sump were not removed, but the media affected by these potential sources were addressed in accordance with the AROD. Remediation activities required by the AROD included excavation of contaminated site soils, excepting contaminated soil beneath the former Drip Pad Building and former CCA Treatment Building, which were left in place. Existing site ECs sealed the floors of the buildings remaining on-site and added measures to divert surface water runoff and groundwater discharge away from the soils below the buildings. These ECs are intended to isolate the potential sources of contamination and prevent some of the secondary release mechanisms from acting as viable pathways for contaminant transport (e.g., preventing re-exposure of the remaining contaminated soil beneath the buildings). However, the remaining arsenic, total chromium, and hexavalent chromium in the soil beneath the on-site buildings may continue to leach into the groundwater beneath the site and migrate off-site.

The contaminated groundwater plume also is a secondary contaminant source and allows for the migration of contaminants to off-site soils and groundwater. There is also potential for contaminated groundwater to discharge to surface depressions/catch basins during flood conditions, affecting sediment and surface water. The soil beneath the buildings and the contaminated groundwater plume are the only known remaining potential sources of contamination at the Site.

1.5.2 Types of Contaminants and Affected Media

Arsenic, total chromium, and hexavalent chromium are the three COCs at the Site. These heavy metal contaminants were present in CCA, which was used on-site for lumber treatment during BB&S's operation. Heavy metal contaminants are non-biodegradable and can exist in soil for years, which is why the majority of contaminated soil was removed in 2011 as part of the Site remedy. The guidance values for these contaminants are listed by environmental media (groundwater, surface water, and sediment) in Table 1-1. The on-site and off-site sampling locations for groundwater, surface water, and sediment are identified on Figure 1-6.

Groundwater

The analytical results for most of the groundwater samples collected as part of the Supplemental PDI (completed in 2008) exceeded the SCGs for all three COCs. Exceedances of the arsenic SCG were reported for samples collected from on-site wells MW-4, MW-6, and MW-22, and one exceedance was reported for a sample collected from off-site well MW-19D. Exceedances of the SCGs for total and hexavalent chromium were also reported for samples collected in on-site wells MW-5, MW-6, MW-9, and MW-10. There was also an exceedance of the SCG for total chromium in a sample collected at MW-22. Exceedances of the SCG for total chromium were also reported for samples collected in off-site wells MW-16, MW-17I/S, MW-18D, MW-19I/D and MW-20I/S. Additionally, exceedances of the hexavalent chromium SCG were reported in samples collected at MW-17I, MW-18S, and MW-20I/S.

Per the SMP, the long-term monitoring plan includes sampling of all of these wells, which have been sampled on a roughly bi-annual basis. Exceedances of the arsenic SCG were reported for samples collected at MW-4, MW-6, and MW-22 during every monitoring event, though concentrations have decreased over time. The SCG for arsenic has not been exceeded in the samples from any off-site wells since the remedial action (completed in 2011).

Exceedances of the SCGs for total and hexavalent chromium were reported for samples from four on-site wells (MW-6, MW-10, MW-22, and MW-27S) during most monitoring events following the completion of the remedial action in 2011; the concentrations of total and hexavalent chromium have decreased over time in wells MW-10 and MW-22 and have fluctuated in wells MW-6 and MW-27S. Exceedances of the SCGs for total and hexavalent chromium were also reported for samples from two off-site wells (MW-20I/S and MW-17I) during all monitoring events since the remedial action completion; the concentrations of total and hexavalent chromium have remained consistent in samples from MW-20I/S and have decreased over time at MW-17I. The concentrations of total and hexavalent chromium continue to exceed the SCGs in all six wells. The positive analytical results for groundwater samples from Monitoring Event 8 are included in Appendix A-1.

Surface Water

Surface water was not sampled as part of the RI or PDI, but surface water is sampled as part of the monitoring program to track the transport of contaminants through runoff. The SCGs for total chromium were exceeded only during Monitoring Event 6, and this was addressed by sediment removal during Monitoring Event 7. No other SCG exceedances have since been reported. The positive analytical results for surface water sampled during Monitoring Event 8 are included in Appendix A-2.

LEGEND:

BB&S/MWPD/MW ⌖	MONITORING WELL LOCATION
SW/SED ⌖	SURFACE WATER/SEDIMENT SAMPLE
━	BB&S TREATED LUMBER SITE

NOTE:

1. AERIAL PHOTOGRAPHY WAS OBTAINED FROM THE NEW YORK STATE OFFICE OF CYBER SECURITY. THE FLYOVER WAS COMPLETED IN 2010. (SUFFOLK COUNTY ORTHO–IMAGERY 4BAND6inch).

APPROXIMATE
SCALE IN FEET

0 600 1200 1800

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FIGURE 1–6 ON–SITE AND OFF–SITE GROUNDWATER, SURFACE WATER, AND SEDIMENT SAMPLING LOCATIONS
BB&S TREATED LUMBER CORPORATION SITE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NY

Sediment

Sediment was not sampled as part of the RI or PDI, but sediment is sampled as part of the monitoring program to track the transport of contaminants through runoff. The SCOs for arsenic and total chromium were exceeded during Monitoring Event 3, when visible contamination was observed, and during Monitoring Event 6, which was addressed with sediment removal during Monitoring Event 7. The analytical results for a sediment sample from location SED-A (a catch basin at the northwest end of the former Drip Pad Building) exceeded the SCO for arsenic during Monitoring Event 8. Sediment in the catch basin at this location will be removed under a corrective action for site management. The positive analytical results for sediment samples collected during Monitoring Event 8 are included in Appendix A-3.

Subsurface Soil

As a part of the supplemental PDI completed in 2009, soil borings were installed in the contaminated areas that remain in place (i.e., beneath the former CCA Treatment Building and former Drip Pad Building). The highest COC concentrations were detected in samples from below the former CCA Treatment Building, which was sealed with two layers of epoxy as part of the remedial action. To prevent the migration of contamination from beneath the former Drip Pad Building, the floor slab was waterproofed with a waterproofing membrane and an asphalt topcoat as part of the remedial action. All other soils with COC concentrations exceeding guidance values were removed during the remedial action. In order to prevent contaminant migration to soils, sediments with COC concentrations that exceeded the SCOs during Monitoring Event 6 were removed from catch basins, and the PVC pipe connecting the catch basins was flushed of sediment during Monitoring Event 7.

Groundwater-Derived Potable Water

On the BB&S Site, groundwater-derived potable water is filtered. Pre- and post-filtration samples are collected during all monitoring events to confirm contaminant removal. Other locations using groundwater-derived potable water, all of which are off-site, have been monitored for contaminant migration, and the sample analytical results show that these locations are not within the pathway of the groundwater plume. Positive analytical results for groundwater-derived potable water are included in Appendix A-4.

1.5.3 Release Mechanisms

Release mechanisms for the affected media include drilling or other intrusive activities that expose the soil beneath the buildings on-site, the vertical transport of groundwater to sediment and water in surface depressions/catch basins, leaching from the soil beneath the buildings on-site and lateral, downgradient transport of groundwater. Drilling and intrusive activities on-site are currently prevented by ICs, which will remain in place and prevent this release mechanism from becoming an exposure pathway. Leaching is currently prevented through ECs diverting surface water from the soil beneath the building, which prevents this release mechanism from becoming an exposure pathway. The remaining release mechanisms are discussed in Section 1.5.4 in terms of their potential as exposure pathways.

1.5.4 Exposure Pathway Analysis

Potential exposure of humans and ecological receptors to contaminants on- and off-site was evaluated as part of the RI (MPI 1998). Based on the remedial actions and long-term monitoring completed since the RI, the pathway analysis has been modified to reflect current conditions.

For current land use, the remaining potential exposure pathway is through the vertical migration of groundwater to surface water, affecting ecological receptors. This is not a likely pathway due to the depth of contamination in groundwater. Continued monitoring of protective measures existing at the buildings on-site ensures that there is no other pathway for surface water contamination. Exposure to soils has been eliminated by the remedial action, and exposure to groundwater has been eliminated by the potable water supplied to off-site residents through an alternative source.

For future land use, intrusive activities on-site would provide an exposure pathway to contaminated soils, affecting human and ecological receptors. Existing ICs prevent this pathway from being complete. The exposure pathway that currently exists for surface water is also a future exposure pathway. As stated previously, this is not a likely pathway due to the depth of the groundwater contamination. Continued monitoring will confirm that the listed exposure pathways for current and future land use are unlikely and/or incomplete.

1.6 Remedy Performance and Progress Made Toward Site Cleanup Goals

1.6.1 Contaminant Concentrations Before and After Remedial Action

The initial RI at the BB&S Treated Lumber Site was performed in 1998 (MPI 1998). At that time, hexavalent chromium concentrations at recovery well RW-2 (immediately west of MWPD-1D) were 10,810 ppb. When RW-2 was resampled in 2003 as a part of the PDI, the concentration of hexavalent chromium was non-detect (Earth Tech Northeast, Inc. 2007). Significant reductions in the concentrations of total chromium and hexavalent chromium were also seen at additional wells along the axis of the plume, indicating that the chromium contamination plume is attenuating.

The AROD called for the excavation of a significant portion of on-site contaminated soils, which was completed in October 2011. Subsequently, eight monitoring events have occurred, spanning from 2012 to 2016. The highest concentrations of COCs in groundwater have been measured from MW-10 and MW-22 on-site and MW-17S/I/D off-site, and have decreased over time. The concentration of arsenic in samples from on-site monitoring well MW-22 has decreased from 747 ppb in April 2012 to 341 ppb in December 2016. In samples from on-site monitoring well MW-10, the concentration of total chromium decreased from 703 ppb to 119 ppb and the concentration of hexavalent chromium decreased from

651 ppb to 103 ppb over the same period. Trends in on-site wells are discussed further in Sections 2.2 and 2.3.

Off-site, the concentration of total chromium in samples from monitoring well MW-17I, which is on the plume's central axis, has decreased from 700 ppb in October 2008 to 558 ppb in April 2012 and 223 ppb in December 2016. The concentration of hexavalent chromium in samples from MW-17I decreased from 457 ppb in April 2012 to 194 ppb in December 2016. Total chromium and hexavalent chromium have not been detected in samples from wells MW-17S and MW-17D from May 2014 onward, indicating that the contaminant plume is maintaining the same depth in the aquifer. Samples collected from wells downgradient (south) and to the west of MW-17S/I/D have not shown increases in the concentrations of total chromium or hexavalent chromium that correlate with decreases at MW-17I, indicating that the contamination has not migrated westward or significantly southward. Trends in off-site wells are discussed further in Sections 2.2 and 2.3.

1.6.2 Progress Made Toward Cleanup Goals

The following activities have contributed to progress made towards reaching the Site's cleanup goals:

- From September 2010 to November 2011, contaminated soils, excepting those beneath the former CCA Treatment Building and former Drip Pad Building, were removed in accordance with the AROD and ECs were installed at the BB&S Site (EEEPC 2013). Routine sampling of site sediments, and subsequent sediment removal when SCOs are exceeded, prevents exposure to contaminated surface soil.
- In June 2001, a public water line was installed by the SCWA along Old Country Road and Speonk-Riverhead Road, immediately downgradient of the site (AECOM 2009b). The public water line can provide water to residences and businesses situated above the groundwater contaminant plume.
- From 2012 to 2014, potable water sampling was performed at the BB&S Site on a bi-annual and annual basis, and a filter was added to the potable water supply at the Site in 2013 after arsenic was detected in samples collected on-site at concentrations above drinking water standards (EEEPC 2014b). Potable water samples were initially collected at 16 off-site properties during the monitoring events; however, samples have not been routinely collected since Monitoring Event 5A in August 2014 due to a historical lack of COCs as determined by the NYSDOH and the Suffolk County Department of Health Services (SCDHS).

2

Contaminant Trends Analysis for Groundwater

This section describes the calculations and analyses performed to determine the rates of contaminant migration in groundwater and the value of those rates in predicting future contaminant migration behavior and long-term groundwater sampling locations and frequencies.

2.1 Approach for the Contaminant Trends Analysis

Analytical results for groundwater from the eight monitoring events performed from 2012 through 2016 were compared to examine contamination trends by contaminant and by well.

COC concentrations in wells showing consistent trends were plotted in Excel® by sampling event time and used to calculate a best-fit line equation and an R^2 value to quantify how well the best-fit line modeled the COC concentrations over time. R^2 values range from zero to one, with zero signifying no correlation between the line and the data and one signifying perfect correlation between the line and the data. The slope of the best-fit line is the average rate of contaminant decline in the well. These rates were compared by contaminant and by well location to determine the average rate of transport for each of the COCs and for the contaminant plume as a whole.

Wells exhibiting increasing contaminant levels that are immediately downgradient of wells exhibiting decreasing contaminant levels indicate contaminant transport from the region of the upgradient wells to the region of the downgradient wells. The changes in concentration and distance between the wells can be used to determine an average rate of transport for each COC.

2.2 Calculation Approach Limitations

2.2.1 Contaminant Concentration Trends

Of the 36 wells routinely sampled, only three wells show consistent trends in contaminant concentrations, and none shows consistent trends for all of the COCs. Because most of wells do not show consistent trends in contaminant concentrations, the rates obtained from the three wells cannot be used to project trends for the entire contaminant plume.

2.2.2 Transport Determinations

As explained in Section 2.1, increases and decreases in contaminant concentrations in downgradient and upgradient wells, respectively, can be used to determine a rate of contaminant transport. Though these associated increases and decreases in COC concentrations are not found in the wells associated with the Site, it is possible that wells showing decreases in contamination are exhibiting attenuation and/or that the contamination has yet to migrate as far as downgradient wells. If this is the case, then transport may not become apparent for years as the contaminants travel downgradient. As such, decreases cannot be attributed definitively to either attenuation or transport alone.

2.3 Reduced Well Network Sampling Determination

As seen in Tables 2-1, 2-2, and 2-3, groundwater samples from on-site monitoring wells MW-3, MW-9, MW-27I, MW-1D, and MW-2, as well as off-site monitoring wells MW-17S, MW-17D, MW-18S, MW-18D, MW-19S, MW-19I, MW-19D, MW-20D, MW-23S, MW-23I, MW-23D, MW-24S, MW-24I, MW-24D, MW-25S, MW-25I, MW-25D, MW-26S, MW-26I, and MW-26D show concentrations of COCs far beneath the screening criteria and in many cases are non-detect.

Given their historically low concentrations of COCs, the wells identified above are not providing information on attenuation of the plume, plume migration, or areas of the aquifer with unsafe levels of contaminants. As a result, these wells do not need to be sampled frequently. However, periodic sampling of these wells should continue to monitor for any contaminant migration into the areas surrounding these wells.

2.4 Plume Migration Modeling Evaluation and Calculations

Many on-site wells exhibiting significant levels of contamination show fairly consistent levels rather than declines, most likely due to continued contaminant loading from contaminated soil beneath the former CCA Treatment Building and the former Drip Pad Building. Only monitoring well MW-22 shows a steady decrease in arsenic concentration, only MW-10 shows a steady decrease in total chromium concentration, and no on-site well shows a trend in hexavalent chromium concentration.

No off-site well has an arsenic concentration approaching the SCG, and arsenic is routinely non-detect in off-site wells. Off-site monitoring wells MW-20I and MW-20S show relatively stable concentrations of total chromium and hexavalent chromium, and MW-17I is the only off-site monitoring well that shows a steady decrease in total chromium and hexavalent chromium concentrations. None of the other off-site monitoring well show a total chromium or hexavalent chromium concentration approaching the SCGs and are routinely non-detect.

Table 2-1 Comparison of Arsenic Analytical Results Over Time in Groundwater Samples

Monitoring Well	Monitoring Event Arsenic Concentrations (µg/L)[3,4,5]							
	1	2	3	4	5	6	7	8
MW-3[1]	ND	ND	ND	ND	ND	ND	ND	6.4
MW-4[1]	**32.8**	24	18	**28**	17.8	16.9	**29.4**	**49.9**
MW-6[1]	**80.8**	**150**	**49**	**130**	**55.8**	**93.5**	**37.1**	**118**
MW-9[1]	ND	ND	ND	ND	ND	ND	ND	ND
MW-10[1]	ND	ND	ND	ND	ND	ND	ND	ND
MW-22[1]	**747**	**446**	**364**	**700**	**331**	**530**	**295**	**341**
MW-27S[1]	ND	ND	ND	ND	ND	ND	ND	ND
MW-27I[1]	ND	ND	ND	ND	ND	ND	ND	ND
BB&S-1[1]	6.7	N/A	ND	ND	ND	ND	ND	N/A
MW-1D[1]	ND	ND	ND	ND	ND	ND	ND	ND
MW-2S[1]	ND	ND	ND	ND	ND	ND	ND	ND
MW-13[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-17D[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-17I[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-17S[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-18D[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-18I[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-18S[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-19D[2]	ND	4.9	4.3	N/A	ND	ND	ND	ND
MW-19I[2]	ND	ND	ND	N/A	ND	ND	ND	ND
MW-19S[2]	ND	ND	ND	N/A	ND	ND	ND	ND
MW-20D[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-20I[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-20S[2]	ND	ND	ND	ND	ND	ND	ND	ND
MW-23D[2]	ND	4.5	ND	ND	ND	N/A	ND	ND
MW-23I[2]	ND	ND	ND	ND	ND	N/A	ND	ND
MW-23S[2]	ND	ND	ND	ND	ND	N/A	ND	ND
MW-24D[2]	17	15.5	ND	N/A	ND	N/A	ND	ND
MW-24I[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-24S[2]	ND	3.9	ND	N/A	4.4	N/A	ND	ND
MW-25D[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-25I[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-25S[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-26D[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-26I[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-26S[2]	ND	ND	ND	N/A	ND	N/A	ND	ND

Notes:

[1] Denotes on-site monitoring well.

[2] Denotes off-site monioting well.

[3] N/A values signify wells that were not sampled.

[4] ND values signify samples with non-detect results.

[5] Bolded and highlighted values exceed the screening criteria (25 µg/L).

Table 2-2 Comparison of Total Chromium Analytical Results Over Time in Groundwater Samples

Monitoring Well	Monitoring Event Total Chromium Concentrations (µg/L)[3,4,5]							
	1	2	3	4	5	6	7	8
MW-3[1]	ND	4.2	4.5	5.5	24.5	ND	ND	20.1
MW-4[1]	15.6	8.5	15	18	**53**	19.9	15.9	41.5
MW-6[1]	**130**	**223**	**164**	**250**	**312**	**123**	**68.9**	**151**
MW-9[1]	27.4	30	16	15	6.7	11.9	ND	3.9
MW-10[1]	**703**	**283**	**192**	**430**	**186**	**129**	**107**	**119**
MW-22[1]	**791**	**191**	**131**	**660**	**64**	**399**	**65.5**	**680**
MW-27S[1]	44.9	**91**	**56**	**140**	**118**	**115**	35.5	**93.9**
MW-27I[1]	37.6	5.8	ND	ND	ND	ND	ND	3.5
BB&S-1[1]	22.3	N/A	11	10.1	46.6	10.9	5.9	N/A
MW-1D[1]	4.6	4.7	ND	ND	ND	ND	ND	10.9
MW-2S[1]	6.4	12	32	17	14.5	18.8	9.3	18.5
MW-13[2]	1.3	44.9	20	ND	15.7	9.7	11.3	ND
MW-17D[2]	1.3	11.6	ND	ND	ND	ND	ND	ND
MW-17I[2]	**558**	**533**	**556**	ND	**386**	**352**	**309**	**223**
MW-17S[2]	2.1	4.5	5.4	ND	ND	ND	ND	ND
MW-18D[2]	1.8	ND	ND	ND	ND	ND	ND	ND
MW-18I[2]	ND	ND	ND	**480**	ND	ND	ND	ND
MW-18S[2]	1.4	ND	ND	ND	ND	ND	ND	ND
MW-19D[2]	8.7	25.2	12	N/A	ND	ND	ND	3.5
MW-19I[2]	5.2	5.5	ND	N/A	8.1	ND	ND	ND
MW-19S[2]	ND	ND	ND	N/A	ND	ND	ND	ND
MW-20D[2]	1.1	ND	ND	ND	ND	ND	ND	ND
MW-20I[2]	**88**	**93.2**	**97**	**95**	**95**	**97.6**	**95.2**	**93.9**
MW-20S[2]	**238**	**141**	**348**	**150**	**291**	**285**	**235**	**251**
MW-23D[2]	1.7	6	ND	ND	ND	N/A	ND	ND
MW-23I[2]	ND	ND	ND	ND	ND	N/A	ND	ND
MW-23S[2]	1.3	ND	ND	ND	ND	N/A	ND	ND
MW-24D[2]	49	23.6	ND	N/A	ND	N/A	ND	7.5
MW-24I[2]	5.3	8.9	ND	N/A	4.6	N/A	ND	ND
MW-24S[2]	1.1	13.9	6.6	N/A	8.5	N/A	ND	ND
MW-25D[2]	1.3	5.6	ND	N/A	ND	N/A	ND	ND
MW-25I[2]	3	ND	ND	N/A	ND	N/A	ND	ND
MW-25S[2]	4.5	ND	ND	N/A	ND	N/A	ND	3.4
MW-26D[2]	3.5	ND	ND	N/A	ND	N/A	ND	ND
MW-26I[2]	1.3	ND	ND	N/A	ND	N/A	ND	ND
MW-26S[2]	3.5	ND	ND	N/A	ND	N/A	ND	3.9

Notes:

[1] Denotes on-site monitoring well.

[2] Denotes off-site monioting well.

[3] N/A values signify wells that were not sampled.

[4] ND values signify samples with non-detect results.

[5] Bolded and highlighted values exceed the screening criteria (25 µg/L).

Table 2-3 Comparison of Hexavalent Chromium Analytical Results Over Time in Groundwater Samples

Monitoring Well	Monitoring Event Hexavalent Chromium Concentrations (µg/L)[3,4,5]							
	1	2	3	4	5	6	7	8
MW-3[1]	ND	ND	4.4	ND	ND	ND	ND	ND
MW-4[1]	11.1	5.1	14	15	10.4	20.6	17	36.7
MW-6[1]	**118**	**192**	**162**	**240**	**302**	**110**	**62.8**	**136**
MW-9[1]	17.9	22	9.5	10	8.1	ND	ND	ND
MW-10[1]	**651**	**186**	**181**	**52**	**182**	**127**	**98.2**	**103**
MW-22[1]	**715**	**191**	**108**	**610**	45.3	**342**	**77.6**	**600**
MW-27S[1]	33.4	45	44	**53**	**102**	**55.6**	**52.5**	**78.2**
MW-27I[1]	ND	ND	ND	ND	ND	ND	ND	ND
BB&S-1[1]	14.6	N/A	ND	ND	ND	ND	9	N/A
MW-1D[1]	ND	ND	ND	ND	ND	ND	ND	6.9
MW-2S[1]	ND	6.7	ND	7.8	7.5	13	7.9	8.3
MW-13[2]	17	44.2	18	18	12.2	7.5	10.8	ND
MW-17D[2]	5.1	ND	ND	ND	ND	ND	ND	ND
MW-17I[2]	**457**	**525**	**511**	**550**	**343**	**315**	**268**	**194**
MW-17S[2]	ND	ND	ND	ND	18	ND	ND	ND
MW-18D[2]	ND	ND	4.2	ND	9.9	ND	ND	ND
MW-18I[2]	5.9	ND	ND	ND	ND	ND	ND	ND
MW-18S[2]	ND	ND	ND	ND	5.3	ND	ND	ND
MW-19D[2]	ND	ND	ND	N/A	ND	ND	ND	ND
MW-19I[2]	ND	ND	ND	N/A	ND	ND	ND	ND
MW-19S[2]	ND	ND	ND	N/A	5.2	ND	ND	ND
MW-20D[2]	ND	ND	ND	4	3.6	ND	ND	ND
MW-20I[2]	**79**	**92.9**	**97**	**91**	**87.1**	**82.2**	**88.1**	**79.6**
MW-20S[2]	**197**	**137**	**322**	**150**	**223**	**243**	**199**	**237**
MW-23D[2]	ND	ND	3.5	ND	3.6	N/A	ND	ND
MW-23I[2]	ND	ND	4.7	ND	3.6	N/A	ND	ND
MW-23S[2]	ND	ND	ND	ND	4.8	N/A	ND	ND
MW-24D[2]	ND	ND	6.8	N/A	ND	N/A	ND	ND
MW-24I[2]	ND	ND	ND	N/A	7.4	N/A	ND	ND
MW-24S[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-25D[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-25I[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-25S[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-26D[2]	ND	ND	ND	N/A	ND	N/A	ND	ND
MW-26I[2]	ND	ND	ND	N/A	ND	N/A	ND	3.2
MW-26S[2]	ND	ND	4.5	N/A	ND	N/A	ND	ND

Notes:

[1] Denotes on-site monitoring well.

[2] Denotes off-site monioting well.

[3] N/A values signify wells that were not sampled.

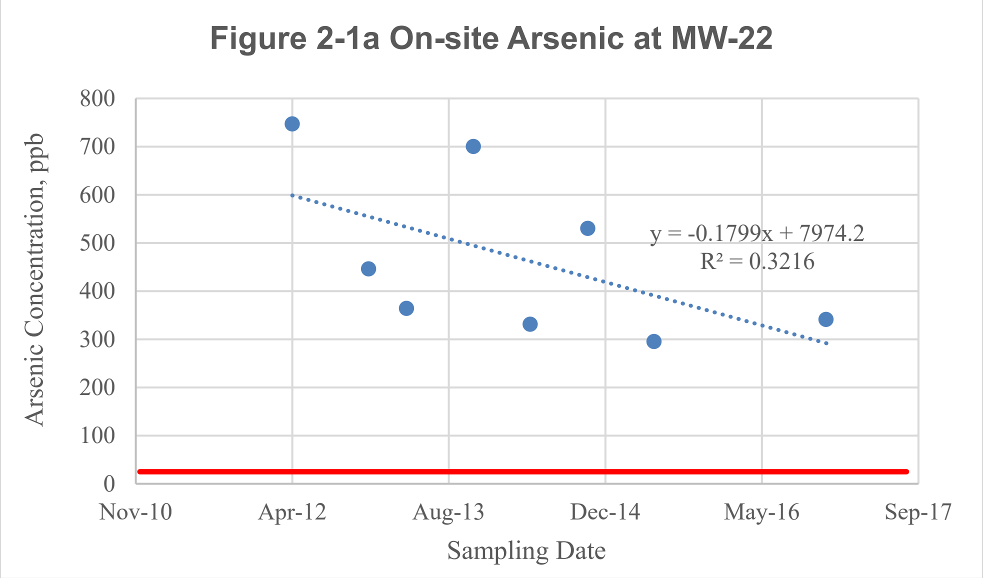
[4] ND values signify samples with non-detect results.

[5] Bolded and highlighted values exceed the screening criteria (50 µg/L).

The rate of contaminant reduction can be analyzed to determine a rate of transport for each COC. To determine the rate of contaminant reduction/transport, analytical results for COCs were plotted and best-fit lines were generated for the data. Monitoring wells MW-22, MW-10, and MW-17I were chosen for this analysis. MW-22 exhibits a declining trend in on-site arsenic, MW-10 exhibits a declining trend in on-site total chromium, and MW-17I exhibits declining trends for off-site total chromium and hexavalent chromium. Contaminant concentration trends for wells exhibiting trends are shown on Figures 2-1a through 2-1d, plotted with analytical data, a best-fit line, and the screening criteria shown for reference.

Although monitoring wells MW-10, MW-22, and MW-17I exhibit declining trends in contaminant concentrations, the rates of decline differ by well and by contaminant. For instance, total chromium and hexavalent chromium are both decreasing at MW-17I, but the slopes of their best-fit lines are not the same, and the fit of the best-fit lines, as described by the R^2 value, are very different. The same is true for total chromium in wells MW-10 and MW-17I. Because so few wells show consistent trends in contaminant concentrations, and those trends differ by well and contaminant, it is unreasonable to assume a rate of attenuation or transport based on historical contaminant concentrations in the monitoring wells. Any modeling of the contaminant transport would be dependent on both the rate of attenuation as well as plume dimensions. Since this information is not available, the contaminant transport cannot be modeled.

Figure 2-1 Contaminant Concentration Trends in On-site and Off-site Wells



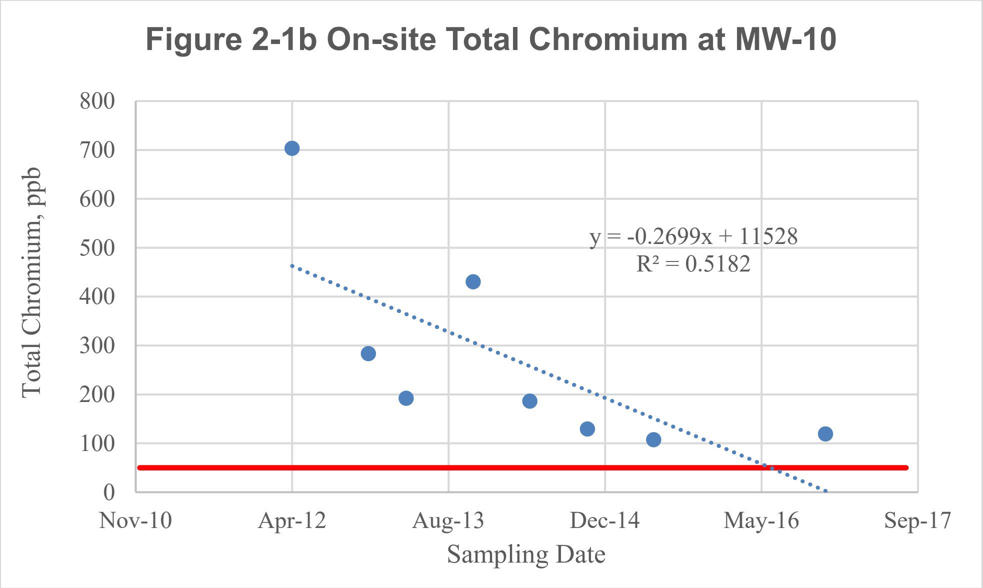


Figure 2-1c Off-site Hexavalent Chromium at MW-17I

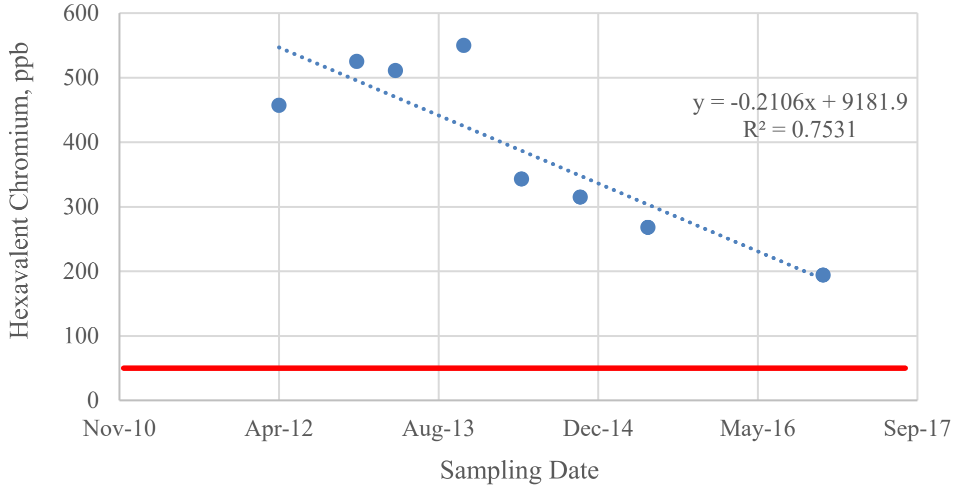
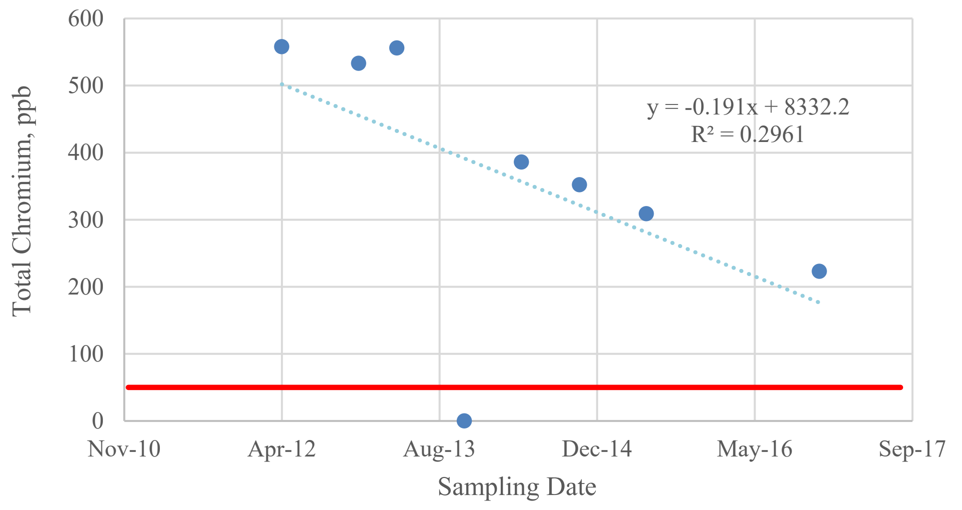


Figure 2-1d Off-site Total Chromium at MW-17I



3 Development of Remedial Site Optimization Alternatives

This section describes the site management elements of the current site remedy considered for modification in the development of optimization alternatives and then presents the various remedial site optimization alternatives under consideration for minimizing contaminant exposure at the BB&S Site.

3.1 Elements of the Current Site Remedy

The RAOs for the BB&S Site are being met with a combination of ICs and ECs, which together comprise the site management remedy.

ICs are non-engineered methods of minimizing potential exposure to contamination, usually through the use of administrative and legal controls. ICs in place at the Site include a monitoring plan, a soil management plan, and an environmental notice (EEEPC 2014c). In order to limit exposure, ICs generally restrict land and resource use and future land development. ICs can be implemented as soon as contamination is discovered and are generally maintained until residual contamination has been reduced to levels allowing for unrestricted exposure and unlimited use. While not adequate for contamination control, ICs used in conjunction with ECs limit present and future risks to human health from contaminant exposure (USEPA 2012).

ECs are designed to control/remove contamination (e.g., through excavation) and physically limit contaminant exposure (e.g., through epoxy barriers). ECs can be associated with ICs, such as monitoring wells for LTM programs. ECs in place at the Site include fencing, surface water drainage and collection, filtering of groundwater-derived potable water, and building improvements to limit the amount of water entering the residual contaminated soils, stabilize the structures of the buildings, and minimize contaminant exposure within the buildings (EEEPC 2014c).

The current ICs and ECs are described below in terms of their applicability to the Site, either as part of the existing Site remedy or as a potential optimization of the remedy.

3.1.1 Environmental Notice

The main IC for the Site is an environmental notice. The notice refers to non-physical mechanisms designed to:

- Restrict the use or development of the site;
- Limit human exposure to contaminants;
- Prevent any action that would threaten the effectiveness or operation and maintenance of a remedy at or pertaining to the site; and
- Implement, maintain, and monitor ECs.

In addition to the ICs identified above as part of the environmental notice, the environmental notice also stipulates the following:

- Compliance with the SMP (EEEPC 2014a);
- Restrictions on the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the NYSDOH and/or the SCDHS;
- Periodic certification of ICs and ECs by the property owner;
- Limiting future on-site COC concentrations to levels that would permit "commercial or industrial use" as defined by 6 NYCRR Part 375; and
- Limiting future off-site COC concentrations to levels that would permit "unrestricted use" as defined by 6 NYCRR Part 375.

All alternatives considered in this RSO report include the ICs included in the environmental notice and described above.

3.1.2 Soils Management Plan

An on-site Soils Management Plan was submitted to NYSDEC in June 2014 as a part of the SMP (EEEPC 2014a). The Soils Management Plan provides guidance for the proper handling and final disposition of CCA-contaminated soil/sediments and materials excavated in and around the site. This guidance includes specification of on-site areas that are considered to be contaminated with CCA and requirements for sampling, handling of sediment and excavated material, transport and disposal of material, selection and placement of backfill material, and disposal of investigation-derived waste.

For activities in potentially contaminated areas, the Soils Management Plan requires a detailed work plan addressing methods of excavation or maintenance, precipitation runoff and groundwater control, handling and storing of the contaminated sediment or excavated materials on-site, and the proper transport and disposal of the sediment or excavated material. A Health and Safety Plan for the work is also required.

3.1.3 Building/Site Improvements

The ECs for the Site limit site access, protect building occupants, stabilize on-site buildings, and control surface water to limit contamination of runoff and the off-site migration of contaminated surface water. The ECs are summarized below.

- The former Drip Pad Building:
  - The existing floor slab was waterproofed with a waterproofing membrane and an asphalt topcoat;
  - Roof support columns were repaired to stabilize the building’s structure;
  - The drainage system on the west side of the building was improved to drain surface water and roof runoff away from the building and residual contamination beneath it. This drainage system empties into the culvert that crosses Speonk-Riverhead Road; and
  - A stone drip pad was installed around the east perimeter of the building to disperse roof runoff away from the building and the underlying contamination soils.
- The former CCA Treatment Building:
  - The existing floor slab was sealed with two layers of epoxy coating to prevent contaminants from resurfacing through the floor slab; and
  - The drainage system was improved to drain surface water and roof runoff away from the building and residual contamination beneath it. This drainage system empties into the culvert that crosses Speonk-Riverhead Road.
- The former Frame Storage Building:
  - Contaminated soil was excavated in selected areas to a depth of 1 foot, and a concrete floor was installed in the rack area of the building.
- Surface Water Management:
  - A drainage swale was installed east of the firmer Drip Pad Building and former Frame Storage Building in an attempt to prevent stormwater runoff from entering the Frame Storage Building;
  - A catch basin and culvert system were constructed at the entrance to the drainage swale on the west side of Speonk-Riverhead Road;
  - Two retention ponds were constructed at the north and south boundaries of the Site to collect surface water runoff and increase retention time before the stormwater is discharged off-site.
- Groundwater-derived Potable Water Filtration
  - Arsenic was detected at 17 ppb in a groundwater-derived potable water sample collected on May 2, 2013 from the BB&S site. This concentration exceeded the arsenic maximum contaminant level (MCL; 10 ppb), prompting the NYSDOH and EEEPC to direct the property owner to install a filter for the on-site water supply. The filter was installed in Sum-

mer 2013 and arsenic concentrations have not exceeded the MCL during any monitoring events since.

- Access Control:
  - To prevent unauthorized access to the site, fences enclose the property and are locked when the site is not in use.

All ECs are inspected during annual site inspections as required by the SMP, and maintenance is performed on an as-needed basis. All alternatives presented in the RSO contain ECs.

3.1.4 Long-Term Monitoring

LTM of the Site remedy is performed to assess the overall reduction of groundwater contaminants. Groundwater monitoring is performed at wells located on-site and off-site, in the center-line of the plume. Currently, the groundwater plume and on-site and off-site sediment and surface water are monitored routinely for metals and VOCs. The four monitoring programs and their respective schedules are provided in Table 3-1.

Table 3-1 Inspection Frequency of Environmental Media

Monitoring Program	Inspection Frequency
Groundwater	Annually
Potable Water	Annually, or as needed
Sediment	Annually, or as needed
Surface Water	Annually, or as needed

Monitoring activities will continue until remedial objectives and site SCGs have been achieved. In addition, site closure may be initiated if it can be demonstrated that the majority of groundwater contamination has been reduced, the site no longer presents a threat to human health or the environment, and the remedy has been implemented and optimized to its full extent and cannot be modified or improved to achieve the remedial objectives and site SCGs (NYSDEC 2010a).

3.2 Remedial Site Optimization Alternative Features

All alternatives considered in this RSO report include LTM and inspection of ECs. It is assumed that LTM results will be periodically reviewed against site-specific decision frameworks to identify opportunities to reduce costs by mothballing or decommissioning monitoring wells, as warranted, and evaluating the progress toward site closure.

Under the alternatives presented in this report, groundwater, potable water, surface water, and sediment samples would continue to be analyzed for metals, except for mercury. Sampling for VOCs and mercury would be discontinued based on results being consistently below the screening criteria since site management was initiated in 2012.

3.2.1 Monitoring Well Network Improvements

NYSDEC's Commissioner Policy (CP)-43: Groundwater Monitoring Decommissioning Policy, issued in 2009, serves as guidance for the decommissioning of groundwater monitoring wells (NYSDEC 2009b). Because wells provide a direct path from the ground surface to the water table, they are considered to be an environmental liability; therefore, decommissioning is recommended when wells reach the end of their usable life. CP-43 states, "Environmental monitoring wells should be decommissioned when: 1) they are no longer needed and re-use by another program is not an option; or 2) the well's integrity is suspect or compromised" (NYSDEC 2009b). Additional guidance on developing decision trees for removing wells from monitoring programs was provided by the Interstate Technology & Regulatory Council (ITRC 2004, 2007). The results of LTM over the course of eight monitoring events show that two wells meet these criteria for decommissioning.

Monitoring well MW-5 has been dry since Monitoring Event 2 in December 2012 because the well is too shallow to reach the current groundwater table. Given the position of MW-5 relative to other monitoring wells, if the groundwater level were to rise, this well would not provide additional information that would aid in the characterization of groundwater contamination on-site or contamination migration off-site. Therefore, MW-5 is being considered for decommissioning.

Monitoring well BB&S-1 existed on-site before remedial studies and actions began. During Monitoring Events Two and Eight, obstructions in the well prevented sampling. During Monitoring Events Three and Four, turbidity in the water samples exceeded 50 nephelometric turbidity units (NTUs), requiring filtering by the processing laboratories before the samples could be analyzed. There are no well construction logs for this well; therefore, it cannot be determined if turbidity is the result of poor well construction. Obstructions and turbidity issues indicate that the well's integrity may be compromised, and as a result, the well is being considered for decommissioning. BB&S-1 is the only well present on the eastern half of the Site, and off-site wells are west of this well, with the exception of nested wells MW-23, MW-24, and MW-26, which are located south of Old Country Road. These nested wells are the southernmost wells in the monitoring network and yield exceptionally low levels of COCs due to their distance from the Site. BB&S-1 has shown varying levels of total chromium over the six sampling events during which it could be sampled, and the concentrations have approached SCG limits.

Due to the location of well BB&S-1 and the levels of total chromium present in the groundwater at this location, replacement of the well is being considered so the well can consistently yield samples within turbidity limits, providing the only groundwater data available for the east side of the Site. The existing well may be replaced with a new well of identical depth or a nested well. Replacement with a nested well would allow for the characterization of contamination in the shallow, intermediate, and deep portions of the aquifer and provide insight into contaminant migration off the east side of the site.

All monitoring well decommissioning shall be performed in accordance with NYSDEC's CP-43.

3.2.2 Monitoring Well Sampling Frequency

As discussed in Section 2, some wells have sample concentrations consistently below COC screening criteria and/or at non-detect concentrations. These wells could be sampled less frequently, given the minimal information they provide on COC transport in the Site groundwater. The off-site wells within this group are recommended for triennial sampling instead of annual sampling, as listed below in Table 3-2. The on-site wells within this group will continue to be sampled annually as sentinel wells to detect any changes in contaminant migration.

Table 3-2 Annual and Triennial Groundwater Sampling Schedule

Annual Monitoring Wells	Triennial Monitoring Wells
MW-3	MW-17S,D
MW-4	MW-18S,D
MW-5	MW19S, I, D
MW-6	MW-20D
MW-9	MW-23S, I, D
MW-10	MW-24S, I, D
MW-22	MW-25S, I, D
MW-27S,I	MW-26S, I, D
BB&S-1	
MW-13	
MW-17I	
MW-18I	
MW-20S,I	
MW-1D	
MW-2S	

3.3 Remedial Site Optimization Alternatives

Table 3-3 presents the remedial optimization alternatives as a matrix of different monitoring plan schedules and monitoring well network improvements. All alternatives include a site monitoring plan, soil management plan, environmental notice, site fencing, and continued on-site improvements and maintenance when and where such actions are appropriate. Each alternative is described below.

Table 3-3 Remedial Site Optimization Alternatives and Sampling Frequencies

Monitoring Well Network	Annual Sampling	Annual and Triennial Sampling
Existing well network	Alternative 1	Alternative 3
Existing well network; Decommission MW-5	Alternative 2a	Alternative 4a
Existing well network; Decommission BB&S-1, Commission identical well	Alternative 2b	Alternative 4b
Existing well network; Decommission BB&S-1, Commission nested well	Alternative 2c	Alternative 4c
Existing well network; Decommission MW-5;Decommission BB&S-1, Commission identical well	Alternative 2d	Alternative 4d
Existing well network; Decommission MW-5; Decommission BB&S-1, Commission nested well	Alternative 2e	Alternative 4e

3.3.1 Alternative 1: Annual Sampling with the Existing Well Network

Alternative 1 is the current Long-Term Sampling Program but without sample analysis for VOCs and mercury, with the existing well network. Under the current sampling program, all monitoring wells and specified sediment, potable water, and surface water locations are sampled annually. Under this alternative, it is likely that MW-5 will remain dry and difficulties sampling BB&S-1 will continue.

3.3.2 Alternative 2: Annual Sampling with a Modified Well Network

Alternative 2 is the current Long-Term Sampling Program but without sample analysis for VOCs and mercury, with a modified well network. Under the current sampling program, all monitoring wells and specified sediment, potable water, and surface water locations are sampled annually. Alternative 2a modifies the monitoring well network by decommissioning MW-5. Alternative 2b modifies the monitoring well network by decommissioning BB&S-1 and replacing it with an identical well, with a depth of approximately 77 feet below the top of the inner well casing (BTOIC). Alternative 2c modifies the monitoring well network by decommissioning BB&S-1 and replacing it with a nested well to depths of approximately 50 feet, 77 feet, and 115 feet BTOIC. Alternative 2d modifies the monitoring well network by decommissioning MW-5 and BB&S-1 and replacing BB&S-1 with an identical well, with a depth of approximately 77 feet BTOIC. Alternative 2e modifies the monitoring well network by decommissioning MW-5 and BB&S-1 and replacing BB&S-1 with a nested well to depths of approximately 50 feet, 77 feet, and 115 feet BTOIC.

3.3.3 Alternative 3: Annual and Triennial Sampling with the Existing Well Network

Alternative 3 is an annual and triennial sampling program with the existing well network. Under the annual and triennial sampling program, monitoring wells will be sampled as shown in Table 3-2, based on historical levels of contamination at each well. All specified sediment, potable water, and surface water locations will be sampled annually. Under this alternative, it is likely that MW-5 will remain dry and that difficulties with sampling BB&S-1 will continue.

3.3.4 Alternative 4: Annual and Triennial Sampling with a Modified Well Network

Alternative 4 is an annual and triennial sampling program with a modified well network. Under the annual and triennial sampling program, monitoring wells will be sampled as shown in Table 3-2, with the possible exception of MW-5 and BB&S-1. If MW-5 is decommissioned, it will not be sampled; if BB&S-1 is decommissioned and replaced, the replacement well will be sampled on an annual basis. All specified sediment, potable water, and surface water locations will be sampled bi-annually. Alternative 4a modifies the monitoring well network by decommissioning MW-5. Alternative 4b modifies the monitoring well network by decommissioning BB&S-1 and replacing it with an identical well, with a depth of approximately 50 feet BTOIC. Alternative 4c modifies the monitoring well network by decommissioning BB&S-1 and replacing it with a nested well to depths of approximately 50 feet, 77 feet, and 115 feet BTOIC. Alternative 4d modifies the monitoring well network by decommissioning MW-5 and BB&S-1 and replacing BB&S-1 with an identical well, with a depth of approximately 77 feet BTOIC. Alternative 4e modifies the monitoring well network by decommissioning MW-5 and BB&S-1 and replacing BB&S-1 with a nested well to depths of approximately 50 feet, 77 feet, and 115 feet BTOIC.

4 Alternatives Evaluation

This section evaluates the RSO alternatives described in Section 3, which are based on the modeling results discussed in Section 2. The alternatives are evaluated in terms of the following criteria: implementability, effectiveness, costs, and time to achieve groundwater SCGs.

4.1 Evaluation Criteria

- **Implementability:** This includes factors such as access and constructability.
- **Effectiveness:** For the purposes of this RSO report, the effectiveness of the alternative is defined as the ability of an option to characterize contamination of various media both on- and off-site and monitor contaminants at the ground surface and in potable water for the protection of human health.
- **Costs:** NYSDEC's Draft Remedial Site Optimization (RSO) Guidance indicates that a net present worth analysis is used to support an RSO recommendation for optimization efforts not associated with operation and maintenance (NYSDEC 2011). The RSO Guidance document describes the net present worth analysis as based on a "realistic projection of the anticipated time that the remedy will need to operate." Screening-level cost estimates were developed for the alternatives and include both capital and long-term annual costs, such as ICs, system operation/maintenance, and LTM. Feasibility-style cost estimates, such as those presented in this report, have an expected accuracy range from -30 to +50 percent for detailed analysis of alternatives (USEPA 2000). Estimated capital costs are added to the periodic costs as total present value costs. The present value is the investment amount required at the start of the remedy implementation (base year) to ensure that funds will be available in the future, assuming a discount factor of 5%.
- **Time to Achieve Groundwater SCGs:** MNA is a slow process that can take centuries to effectively reduce contaminant concentrations. Due to the extensive timeframe to achieve SCGs, all alternatives are analyzed over a 30-year period to take into account both capital costs and LTM.
- **Sustainability:** The purpose of this criterion is to consider cleanups in the context of the larger environment and consistently and proactively apply more sustainable methods to remediate the site. Per NYSDEC's Green Remediation Program Policy (2010b), qualitative green metrics can help determine which alternative has the greatest net benefit or least impact. Some of these

metrics include travel required to maintain the remedy and relative environmental impacts of implementing the remedies.

4.2 Evaluation of Alternatives

Table 4-1 evaluates and compares the alternatives presented in Section 3 against the evaluation criteria presented in Section 4.1. Cost estimates are provided in Appendix B.

Table 4-1 Alternatives Evaluation

Implementability	Effectiveness	Estimated Time to Reach SCGs	Sustainability	Net Present Value of Life-cycle Costs
Alternative 1 Bi-annual and Annual Sampling with the Existing Well Network				
Readily implementable as the existing remedy is in place.	The existing bi-annual and annual sampling program effectively monitors contamination at the ground surface and in potable water for protection of human health. Issues with monitoring well BB&S-1 limit knowledge of contamination on the east side of the site.	Over 30 years	Monitoring wells MW-5 and BB&S-1 are potential pathways for the movement of surface pollution into the groundwater. Travel time required for implementation is greater than for Alternatives 3 and 4.	$1,422,000
Alternative 2a Bi-annual and Annual Sampling with a Modified Well Network (Decommission MW-5)				
Feasible; the existing sampling program is in place and MW-5 is on the former BB&S site, allowing access.	As in Alternative 1, the existing bi-annual and annual sampling program effectively monitors contamination at the ground surface and in potable water for protection of human health. Issues with monitoring well BB&S-1 limit knowledge of contamination on the east side of the site.	Over 30 years	Monitoring well BB&S-1 is a potential pathway for the movement of surface pollution into the groundwater Travel time required for implementation is greater than for Alternatives 3 and 4.	$1,408,000
Alternative 2b Bi-annual and Annual Sampling with a Modified Well Network (Decommission BB&S-1 and Replace with an Identical Well)				
Feasible; the existing sampling program is in place and BB&S-1 is on the former BB&S site, allowing access.	The existing bi-annual and annual sampling program effectively monitors contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with an identical well will provide information about contamination on the east side of the site, but only at the intermediate level of the aquifer.	Over 30 years	Dry monitoring well MW-5 is a potential pathway for the movement of surface pollution into the groundwater. Travel time required for implementation is greater than for Alternatives 3 and 4.	$1,427,000

Table 4-1 Alternatives Evaluation

Implementability	Effectiveness	Estimated Time to Reach SCGs	Sustainability	Net Present Value of Life-cycle Costs
Alternative 2c Bi-Annual and Annual Sampling with a Modified Well Network (Decommission BB&S-1 and Replace with a Nested Well)				
Feasible; the existing sampling program is in place and BB&S-1 is on the former BB&S site, allowing access.	The existing bi-annual and annual sampling program effectively monitors contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with a nested well will provide information about contamination on the east side of the site throughout the aquifer.	Over 30 years	Dry monitoring well MW-5 is a potential pathway for the movement of surface pollution into the groundwater. Travel time required for implementation is greater than for Alternatives 3 and 4.	$1,464,000
Alternative 2d Bi-annual and Annual Sampling with a Modified Well Network (Decommission BB&S-1 and MW-5, Replace BB&S-1 with an Identical Well)				
Feasible; the existing sampling program is in place and MW-5 and BB&S-1 are on the former BB&S site, allowing access.	The existing bi-annual and annual sampling program effectively monitors contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with an identical well will provide information about contamination on the east side of the site, but only at the intermediate level of the aquifer.	Over 30 years	This alternative protects humans and the environment while having minimal environmental impact. Travel time required for implementation is greater than for Alternatives 3 and 4.	$1,413,000
Alternative 2e Bi-annual and Annual Sampling with a Modified Well Network (Decommission BB&S-1 and MW-5, Replace BB&S-1 with a Nested Well)				
Feasible; the existing sampling program is in place and MW-5 and BB&S-1 are on the former BB&S site, allowing access.	The existing bi-annual and annual sampling program effectively monitors contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with a nested well will provide information about contamination on the east side of the site throughout the aquifer.	Over 30 years	This alternative protects humans and the environment while having minimal environmental impact. Travel time required for implementation is greater than for Alternatives 3 and 4.	$1,448,000
Alternative 3 Annual and Triennial Sampling with the Existing Well Network				
Readily implementable as the existing remedy is in place.	The sampling program will effectively monitor contamination at the ground surface and in potable water for protection of human health. Issues with monitoring well BB&S-1 limit knowledge about contamination on the east side of the site.	Over 30 years	Monitoring wells MW-5 and BB&S-1 are potential pathways for the movement of surface pollution into the groundwater.	$1,126,000

Table 4-1 Alternatives Evaluation

Implementability	Effectiveness	Estimated Time to Reach SCGs	Sustainability	Net Present Value of Life-cycle Costs
Alternative 4a Annual and Triennial Sampling with a Modified Well Network (Decommission MW-5)				
Feasible; the sampling program is easily changed and MW-5 is on the former BB&S site, allowing access.	The sampling program will effectively monitor contamination at the ground surface and in potable water for protection of human health. Issues with monitoring well BB&S-1 limit knowledge about contamination on the east side of the site.	Over 30 years	Monitoring well BB&S-1 is a potential pathway for the movement of surface pollution into the subsurface and groundwater.	$1,112,000
Alternative 4b Annual and Triennial Sampling with a Modified Well Network (Decommission BB&S-1 and Replace with an Identical Well)				
Feasible; the sampling program is easily changed and BB&S-1 is on the former BB&S site, allowing access.	The sampling program will effectively monitor contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with an identical well will provide information about contamination on the east side of the site throughout the aquifer.	Over 30 years	Dry monitoring well MW-5 is a potential pathway for the movement of surface pollution into the subsurface and groundwater.	$1,131,000
Alternative 4c Annual and Triennial Sampling with a Modified Well Network, decommission BB&S-1 and replacing with nested well				
Feasible; the sampling program is easily changed and BB&S-1 is on the former BB&S site, allowing access.	The sampling program will effectively monitor contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with a nested well will provide information on contamination at the east end of the site throughout the aquifer.	Over 30 years	Dry monitoring well MW-5 is a potential pathway for the movement of surface pollution into the groundwater.	$1,166,000

Table 4-1 Alternatives Evaluation

Implementability	Effectiveness	Estimated Time to Reach SCGs	Sustainability	Net Present Value of Life-cycle Costs
Alternative 4d Annual and Triennial Sampling with a Modified Well Network (Decommission BB&S-1 and MW-5, Replace BB&S-1 with an Identical Well)				
Feasible; the sampling program is easily changed and MW-5 and BB&S-1 are on the former BB&S site, allowing access.	The sampling program will effectively monitor contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with an identical well will provide information about contamination on the east side of the site throughout the aquifer.	Over 30 years	This alternative protects humans and the environment while having minimal environmental impact.	$1,129,000
Alternative 4e Annual and Triennial Sampling with a Modified Well Network (Decommission BB&S-1 and MW-5, Replace BB&S-1 with a Nested Well)				
Feasible; the sampling program is easily changed and MW-5 and BB&S-1 are on the former BB&S site, allowing access.	The sampling program will effectively monitor contamination at the ground surface and in potable water for protection of human health. Replacement of BB&S-1 with a nested well will provide information about contamination on the east side of the site throughout the aquifer.	Over 30 years	This alternative protects humans and the environment while having minimal environmental impact.	$1,166,000

Key:

NYSDEC = New York State Department of Environmental Conservation
SCGs = Standards, Criteria and Guidelines

5

Recommended Alternative for Remedial Site Optimization

EEEPC recommends that NYSDEC consider Alternative 4e, Annual and Triennial Sampling with a Modified Well Network (Decommission BB&S-1 and MW-5, Replace BB&S-1 with a Nested Well), for remedial site optimization at the BB&S Treated Lumber Corporation Site. Alternative 4e is recommended because it is the most cost-effective option that meets the evaluation criteria and is readily implementable. Alternative 4e is estimated to cost $1,166,000 over 30 years (see Table B-13 in Appendix B), whereas Alternative 1, the current sampling plan and monitoring well network, but without analysis for VOCs and mercury, is estimated to cost $1,422,000 over the same period (see Table B-2 in Appendix B). Monitoring under the current sampling plan and monitoring well network, with analysis for VOCs and mercury included, has a present value cost of $1,560,000. Therefore, implementation of Alternative 4e would provide a cost savings of $394,000.

Annual and triennial sampling will provide the necessary information on contamination while minimizing cost and sampling effort. Decommissioning monitoring wells MW-5 and BB&S-1 will eliminate the risk of introducing further contamination to the subsurface and groundwater from wells that have outlived their usefulness. Replacing BB&S-1 with a nested well will provide valuable information about groundwater contamination on the east side of the site and potential migration of contaminants from the east side of the site.

Implementation of Alternative 4e would require an update to the SMP. Tables and text in Section 3 and Appendices D, E, and G of the SMP would need to be adjusted to account for annual sampling of potable water, sediment, surface water, and some wells, as well as triennial sampling of all wells, potable water, sediment, and surface water.

Monitoring, reporting, and response actions such as soil removal would continue until LTM has shown the plume is stable or until SCGs have been achieved to the furthest extent practical.

Based on this RSO analysis, EEEPC concludes that Alternative 4e is a substantially better alternative for monitoring site contamination at a substantial cost savings.

6 References

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A

Analytical Results for Monitoring Event 8

Table A-1 Summary of Positive Analytical Results for Groundwater Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

		Location ID:	MW-3	MW-4	MW-6	MW-9	MW-10	MW-10	MW-13	MW-17S	MW-17I	MW-17D
		Sample Name:	MW-3-EVENT8	MW-4-EVENT8	MW-6-EVENT8	MW-9-EVENT8	MW-10-EVENT8	MW-10-EVENT8-FD	MW-13-EVENT8	MW-17S-EVENT8	MW-17I-EVENT8	MW-17D-EVENT8
		Date:	11/28/2016	11/28/2016	11/29/2016	11/29/2016	11/30/2016	11/30/2016	12/9/2016	12/20/2016	12/20/2016	12/20/2016
Analyte	Screening Criteria (1)	Notes										
Volatile Organic Compounds by Method E524.2 (µg/L)												
2-Nitropropane	N/A		0.14 U	0.14 U	0.14 U	0.14 U	0.14 UJ	0.14 UJ	0.14 U	**0.14**	**0.14**	**0.14**
Chloroform	7		0.092 U	0.092 U	0.092 U	**0.17 J**	0.092 U	0.092 U	**1.0**	**0.12 J**	**0.30 J**	**0.23 J**
Chloromethane	5		0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U
Tert-Butyl Methyl Ether	10	G	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U
Tetrachloroethylene	5		0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	**0.10 J**	0.097 U	0.097 U
Trichlorofluoromethane	5		0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
Perfluorinated Compounds by Method E537-LL (ng/L)												
Perfluorobutanesulfonic acid (PFBS)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	N/A		ND	ND	ND	ND	**2.28**	**2.21**	ND	ND	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	N/A		ND	**2.26**	**3.58**	ND	**5.55**	**5.32**	ND	**6.19**	ND	ND
Perfluorononanoic acid (PFNA)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	N/A		**2.32**	**2.34**	**8.47**	ND	**7.08**	**7.32**	ND	**7.14**	ND	ND
Perfluorooctanoic acid (PFOA)	N/A		**4.81**	**2.82**	**6.03**	**3.61**	**10.9**	**10.1**	ND	**3.59**	ND	ND
Total PFOA and PFOS	70	G	**7.13**	**5.16**	**14.5**	**3.61**	**18.0**	**17.4**	ND	**10.7**	ND	ND
Metals by Method SW-846 6010C (µg/L)												
Aluminum	N/A		**991**	**185 J**	**279**	**157 J**	**800**	**1090**	**104 J**	**330**	**316**	**159 J**
Arsenic	25		**6.4 J**	**49.9**	**118**	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Barium	1000		**17.5 J**	**22.3 J**	**16.1 J**	**23.7 J**	8.6 U	8.6 U	**23.7 J**	**16.9 J**	**56.6 J**	8.6 U
Calcium	N/A		**12800**	**32500**	**28800**	**13600**	**26000**	**26200**	**7840**	**13200**	**4020 J**	**2840 J**
Chromium, Total	50		**20.1**	**41.5**	**151**	**3.6 J**	**113**	**119**	3.3 U	3.3 U	**223**	3.3 U
Copper	200		**9.6 J**	8.1 U	**17.6 J**	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U
Iron	300		**1020**	**174**	92.1 U	**221**	92.1 U	92.1 U	92.1 U	**342**	**318**	**127 J**
Lead	25		4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Magnesium	35000	G	**2310 J**	**5600**	**3620 J**	**3120 J**	**3360 J**	**3440 J**	**2290 J**	**1770 J**	**4530 J**	**1690 J**
Manganese	300		**30.2**	**7.3 J**	3.1 U	**31.7**	3.1 U	3.1 U	**184**	**11.7 J**	**18.1**	3.1 U
Potassium	N/A		**804 J**	**2670 J**	**2540 J**	**402 J**	**2260 J**	**2280 J**	**440 J**	**2170 J**	**1820 J**	**518 J**
Sodium	20000		**9410**	**36300**	**7350**	**44100**	**9310**	**9390**	**69000**	**9560**	**27600**	**5420**
Vanadium	N/A		2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	2000		9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	**27.9 J**	**37.5**	**13.2 J**
Hexavalent Chromium by Method SW-846 7196A (µg/L)												
Chromium, Hexavalent	50		2.7 U	**36.7**	**136**	2.7 U	**103**	**97.2**	2.7 U	2.7 U	**194**	2.7 U
Mercury by Method SW-846 7470A (µg/L)												
Mercury	0.7		0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-1 Summary of Positive Analytical Results for Groundwater Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

		Location ID:	MW-18S	MW-18I	MW-18D	MW-19S	MW-19I	MW-19D	MW-20S	MW-20I	MW-20D	MW-22
		Sample Name:	MW-18S-EVENT8	MW-18I-EVENT8	MW-18D-EVENT8	MW-19S-EVENT8	MW-19I-EVENT8	MW-19D-EVENT8	MW-20S-EVENT8	MW-20I-EVENT8	MW-20D-EVENT8	MW-22-EVENT8
		Date:	12/21/2016	12/21/2016	12/21/2016	12/9/2016	12/13/2016	12/12/2016	12/7/2016	12/5/2016	12/5/2016	12/8/2016
Analyte	Screening Criteria (1)	Notes										
Volatile Organic Compounds by Method E524.2 (µg/L)												
2-Nitropropane	N/A		**0.14**	**0.14**	**0.14**	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Chloroform	7		0.092 U	0.18 U	0.18 U	**0.67**	**0.60**	0.092 U	**0.14 J**	0.092 U	**0.37 J**	0.092 U
Chloromethane	5		0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	**0.096 J**	0.074 U	0.074 U
Tert-Butyl Methyl Ether	10	G	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U
Tetrachloroethylene	5		0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U
Trichlorofluoromethane	5		0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
Perfluorinated Compounds by Method E537-LL (ng/L)												
Perfluorobutanesulfonic acid (PFBS)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	**3.49**
Perfluorononanoic acid (PFNA)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	N/A		ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.62**
Perfluorooctanoic acid (PFOA)	N/A		ND	ND	ND	ND	ND	ND	**2.28**	ND	ND	**3.37**
Total PFOA and PFOS	70	G	ND	ND	ND	ND	ND	ND	**2.28**	ND	ND	**9.99**
Metals by Method SW-846 6010C (µg/L)												
Aluminum	N/A		**260**	**198 J**	**1130**	**480**	91.1 U	**3160**	**152 J**	91.1 U	91.1 U	91.1 U
Arsenic	25		4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	**341**
Barium	1000		8.6 U	**61.9 J**	**9.8 J**	**16.1 J**	**17.5 J**	**15.8 J**	**18.2 J**	**44.5 J**	**29.5 J**	8.6 U
Calcium	N/A		**6140**	**4270 J**	**3070 J**	**1050 J**	**7100**	**4220 J**	**12000**	**3480 J**	**6620**	**28600**
Chromium, Total	50		3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	**3.5 J**	**251**	**93.9**	3.3 U	**680**
Copper	200		8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	**14.0 J**
Iron	300		**217**	**184**	**1240**	**578**	**233**	**2100**	**112 J**	92.1 U	92.1 U	92.1 U
Lead	25		4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Magnesium	35000	G	**1380 J**	**3100 J**	**1770 J**	**1210 J**	**5200**	**2380 J**	**1740 J**	**3180 J**	**5270**	**3330 J**
Manganese	300		**28.2**	**7.8 J**	**16.9**	**82.6**	3.1 U	**29.7**	**3.5 J**	**22.8**	3.1 U	3.1 U
Potassium	N/A		**732 J**	**919 J**	**570 J**	**711 J**	**718 J**	**838 J**	**3360 J**	**801 J**	**788 J**	**3230 J**
Sodium	20000		**29300**	**62500**	**5740**	**7390**	**7420**	**5690**	**7970**	**21400**	**12500**	**7360**
Vanadium	N/A		2.5 U	2.5 U	**3.1 J**	2.5 U	2.5 U	**6.5 J**	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	2000		**9.7 J**	**40.1**	**15.9 J**	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U
Hexavalent Chromium by Method SW-846 7196A (µg/L)												
Chromium, Hexavalent	50		2.7 UJ	2.7 UJ	2.7 U	2.7 U	2.7 U	2.7 U	**237**	**79.6**	2.7 U	**600**
Mercury by Method SW-846 7470A (µg/L)												
Mercury	0.7		0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-1 Summary of Positive Analytical Results for Groundwater Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

			MW-23S	MW-23S	MW-23I	MW-23D	MW-24S	MW-24I	MW-24D	MW-25S	MW-25I	MW-25D
Location ID:			MW-23S	MW-23S	MW-23I	MW-23D	MW-24S	MW-24I	MW-24D	MW-25S	MW-25I	MW-25D
Sample Name:			MW-23S-EVENT8	MW-23S-EVENT8-FD	MW-23I-EVENT8	MW-23D-EVENT8	MW-24S-EVENT8	MW-24I-EVENT8	MW-24D-EVENT8	MW-25S-EVENT8	MW-25I-EVENT8	MW-25D-EVENT8
Date:			12/16/2016	12/16/2016	12/16/2016	12/16/2016	12/14/2016	12/13/2016	12/14/2016	12/19/2016	12/19/2016	12/19/2016
Analyte	Screening Criteria (1)	Notes										
Volatile Organic Compounds by Method E524.2 (µg/L)												
2-Nitropropane	N/A		0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Chloroform	7		0.092 U	0.092 U	**0.17 J**	**0.49 J**	0.092 U	**0.60**	0.092 U	**0.58**	**0.90**	0.092 U
Chloromethane	5		0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	**0.10 J**	0.074 U	0.074 U	0.074 U
Tert-Butyl Methyl Ether	10	G	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U
Tetrachloroethylene	5		0.097 U	0.097 U	**0.22 J**	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U
Trichlorofluoromethane	5		0.056 U	0.056 U	**0.067 J**	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
Perfluorinated Compounds by Method E537-LL (ng/L)												
Perfluorobutanesulfonic acid (PFBS)	N/A		ND	ND	ND	ND	ND	ND	ND	**2.39**	ND	ND
Perfluoroheptanoic acid (PFHpA)	N/A		ND	ND	ND	ND	ND	ND	ND	**7.55**	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	N/A		ND	ND	**5.00**	ND	ND	ND	ND	**23.8**	ND	ND
Perfluorononanoic acid (PFNA)	N/A		ND	ND	ND	ND	ND	ND	ND	**5.20**	ND	ND
Perfluorooctanesulfonic acid (PFOS)	N/A		ND	ND	**5.59**	ND	ND	ND	ND	**103**	ND	ND
Perfluorooctanoic acid (PFOA)	N/A		**6.60**	**6.34**	**5.70**	ND	**2.28**	ND	ND	**18.3**	ND	ND
Total PFOA and PFOS	70	G	**6.60**	**6.34**	**11.3**	ND	**2.28**	ND	ND	**121**	ND	ND
Metals by Method SW-846 6010C (µg/L)												
Aluminum	N/A		**95.8 J**	91.1 U	**393**	**163 J**	**139 J**	91.1 U	**2510**	**1500**	**193 J**	**140 J**
Arsenic	25		4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Barium	1000		**12.9 J**	**13.8 J**	**82.5 J**	8.6 U	**15.5 J**	**15.3 J**	**28.9 J**	**35.7 J**	**12.0 J**	8.6 U
Calcium	N/A		**7520**	**7250**	**9200**	**8690**	**7560**	**2530 J**	**4680 J**	**19600**	**2010 J**	**5060**
Chromium, Total	50		3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	**7.5 J**	**3.4 J**	3.3 U	3.3 U
Copper	200		8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U
Iron	300		92.1 U	**144 J**	**548**	**142 J**	**143 J**	**705**	**5600**	**2090**	**389**	**261**
Lead	25		4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Magnesium	35000	G	**2220 J**	**2150 J**	**3000 J**	**5390**	**2980 J**	**2530 J**	**2830 J**	**3200 J**	**1130 J**	**2640 J**
Manganese	300		**4.9 J**	**37.7 J**	**42.5**	**7.1 J**	**13.8 J**	**6.0 J**	**183**	**43.5**	**7.1 J**	**8.1 J**
Potassium	N/A		**3330 J**	**3600 J**	**3720 J**	**571 J**	**1190 J**	**794 J**	**1960 J**	**3860 J**	**811 J**	**527 J**
Sodium	20000		**33200**	**33800**	**13400**	**9670**	**6040**	**6930**	**7520**	**15600**	**9660**	**6480**
Vanadium	N/A		2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**9.0 J**	**4.2 J**	2.5 U	2.5 U
Zinc	2000		9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	9.0 U	**18.2 J**	9.0 U	9.0 U	**11.0 J**
Hexavalent Chromium by Method SW-846 7196A (µg/L)												
Chromium, Hexavalent	50		2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Mercury by Method SW-846 7470A (µg/L)												
Mercury	0.7		0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-1 Summary of Positive Analytical Results for Groundwater Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

Location ID:			MW-26S	MW-26I	MW-26D	MW-27S	MW-27I	MWPD-1D	MWPD-2S
Sample Name:			MW-26S-EVENT8	MW-26I-EVENT8	MW-26D-EVENT8	MW-27S-EVENT8	MW-27I-EVENT8	MWPD-1D-EVENT8	MWPD-2S-EVENT8
Date:			12/15/2016	12/15/2016	12/15/2016	12/2/2016	12/2/2016	11/30/2016	12/2/2016
Analyte	Screening Criteria $^{(1)}$	Notes							
Volatile Organic Compounds by Method E524.2 (µg/L)									
2-Nitropropane	N/A		0.14 U	0.14 U	0.14 U	0.14 U	0.14 UJ	0.14 UJ	0.14 U
Chloroform	7		0.46 U	0.42 U	0.092 U	0.092 U	0.092 U	**0.46 J**	0.092 U
Chloromethane	5		0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U
Tert-Butyl Methyl Ether	10	G	0.075 U	**0.087 J**	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U
Tetrachloroethylene	5		0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U	0.097 U
Trichlorofluoromethane	5		0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U
Perfluorinated Compounds by Method E537-LL (ng/L)									
Perfluorobutanesulfonic acid (PFBS)	N/A		ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	N/A		ND	ND	ND	ND	ND	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	N/A		ND	ND	ND	**5.42**	ND	ND	**2.51**
Perfluorononanoic acid (PFNA)	N/A		ND	ND	ND	ND	ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	N/A		ND	ND	ND	ND	**2.27**	ND	**2.71**
Perfluorooctanoic acid (PFOA)	N/A		**4.24**	ND	ND	**3.11**	**2.16**	ND	**3.25**
Total PFOA and PFOS	70	G	**4.24**	ND	ND	**3.11**	**4.43**	ND	**5.96**
Metals by Method SW-846 6010C (µg/L)									
Aluminum	N/A		**2140**	**146 J**	**104 J**	**578**	91.1 U	**384**	**623**
Arsenic	25		4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Barium	1000		**10.6 J**	**17.6 J**	8.6 U	**33.6 J**	**30.5 J**	**43.5 J**	**26.9 J**
Calcium	N/A		**6690**	**2460 J**	**4110 J**	**20700**	**6410**	**8130**	**14700**
Chromium, Total	50		**3.9 J**	3.3 U	3.3 U	**93.9**	**3.5 J**	**10.9**	**18.5**
Copper	200		8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U
Iron	300		**3000**	**178**	**167**	**1240**	**149 J**	**846**	**1260**
Lead	25		4.1 U	4.1 U	4.1 U	**7.4 J**	4.1 U	4.1 U	**7.5 J**
Magnesium	35000	G	**1770 J**	**2030 J**	**2110 J**	**3120 J**	**3160 J**	**4890 J**	**2160 J**
Manganese	300		**151**	**10.4 J**	**6.2 J**	**60.9**	**11.9 J**	**8.1 J**	**45.1**
Potassium	N/A		**2140 J**	**1150 J**	**594 J**	**2470 J**	**603 J**	**1040 J**	**1410 J**
Sodium	20000		**40200**	**8230**	**5670**	**5640**	**13100**	**13500**	**3920 J**
Vanadium	N/A		**7.0 J**	2.5 U	2.5 U	**3.0 J**	2.5 U	2.5 U	**2.7 J**
Zinc	2000		**14.9 J**	**10.5 J**	**13.1 J**	9.0 U	9.0 U	9.0 U	9.0 U
Hexavalent Chromium by Method SW-846 7196A (µg/L)									
Chromium, Hexavalent	50		2.7 U	**3.2 J**	2.7 U	**78.2**	2.7 UJ	**6.9 J**	**8.3 J**
Mercury by Method SW-846 7470A (µg/L)									
Mercury	0.7		0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

Key:

Qualifiers

J = Estimated value

U = Not detected (method detection limit shown)

UJ = Not detected/estimated detection limit

Other

µg/L = Micrograms per liter

ng/L = Nanograms per liter

G = Guidance value (no standard available)

N/A = Not regulated/no available criteria

"-FD" denotes field duplicate sample

ND results for PFCs are less than 2 ng/L

Notes

1. New York State Department of Environmental Conservation, Technical and Operational Guidance Series Memorandum #1.1.1: *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations,* 1998 (with updates), Class GA Groundwater Standards and Guidance Values.
2. Bold values denote positive hits.
3. Highlighted cells exceed screening criteria.

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-2 Summary of Positive Analytical Results for Surface Water Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

		Location ID:	SW-2	SW-3	SW-4	SW-5	SW-6	SW-6	SW-8	SW-9
		Sample Name:	SW-2-EVENT8	SW-3-EVENT8	SW-4-EVENT8	SW-5-EVENT8	SW-6-EVENT8	SW-6-EVENT8-FD	SW-8-EVENT8	SW-9-EVENT8
		Date:	12/1/2016	12/1/2016	12/7/2016	12/7/2016	12/1/2016	12/1/2016	12/7/2016	12/7/2016
Analyte	Screening Criteria (1)	Notes								
Metals by Method SW-846 6010C (µg/L)										
Aluminum	N/A		**154 J**	**450**	**576**	**618**	**301**	**353**	**1350**	**250**
Arsenic	50		**7.5 J**	**6.7 J**	4.4 U	4.4 U	**5.8 J**	**8.5 J**	**10.7 J**	4.4 U
Barium	1000		8.6 U	**9.7 J**	**11.8 J**	**12.1 J**	**10.6 J**	**11.3 J**	**14.1 J**	8.6 U
Calcium	N/A		**9300**	**14100**	**8650**	**9500**	**23000**	**23000**	**28400**	**19300**
Chromium, Total	50		3.3 U	**3.3 J**	3.3 U	3.3 U	**5.3 J**	**5.9 J**	**6.7 J**	3.3 U
Copper	200		**9.9 J**	**11.5 J**	**10.9 J**	**12.2 J**	**13.7 J**	**14.3 J**	**18.2 J**	8.1 U
Iron	300		**147 J**	**526**	**700**	**772**	**256**	**299**	**1580**	**198**
Lead	50		4.1 U	**4.6 J**	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Magnesium	35000	G	**1570 J**	**2070 J**	**1100 J**	**1210 J**	**2030 J**	**2030 J**	**5470**	**2400 J**
Manganese	300		**6.6 J**	**16.3**	**18.1**	**28.5**	**4.4 J**	**4.6 J**	**33.3**	**4.9 J**
Potassium	N/A		**1720 J**	**1920 J**	**720 J**	**730 J**	**4970 J**	**4960 J**	**3950 J**	**2390 J**
Sodium	N/A		**5260**	**7620**	**3880 J**	**4270 J**	**7410**	**7490**	**33100**	**2600 J**
Vanadium	N/A		2.5 U	**4.2 J**	**2.8 J**	**3.1 J**	2.5 U	2.5 U	**2.8 J**	2.5 U
Zinc	2000	G	**114**	**106**	**62.6**	**73.0**	9.0 U	**10.2 J**	**14.0 J**	9.0 U
Hexavalent Chromium by Method SW-846 7196A (µg/L)										
Chromium, Hexavalent	50		2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Mercury by Method SW-846 7470A (µg/L)										
Mercury	0.7		0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

Key:

Qualifiers

J = Estimated value

U = Not detected (method detection limit shown)

Other

µg/L = Micrograms per liter

G = Guidance value (no standard available)

N/A = Not regulated/no available criteria

"-FD" denotes field duplicate sample

Notes

1. New York State Department of Environmental Conservation, Technical and Operational Guidance Series Memorandum #1.1.1: *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations,* 1998 (with updates), Class A, A-S, AA, AA-S Surface Water Standards and Guidance Values.
2. Bold values denote positive hits.
3. Shaded values exceed screening criteria.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-3 Summary of Positive Analytical Results for Sediment Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

		Location ID:	SED-A	SED-B	SED-C	SED-E	SED-E
		Sample Name:	SED-A-EVENT8	SED-B-EVENT8	SED-C-EVENT8	SED-E-EVENT8	SED-E-EVENT8-FD
		Date:	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016
Analyte	**Screening Criteria [(1,2)]**	**Notes**					
Metals by Method SW-846 6010C (mg/kg)							
Arsenic	16		**18.4**	**1.3 J**	**1.3 J**	**1.7 J**	**1.7 J**
Chromium, Total	50		**41.8**	**14.4**	**4.0**	**3.6**	**2.9**
Hexavalent Chromium by Method SW-846 7196A (mg/kg)							
Chromium, Hexavalent	19		0.68 U	0.50 U	0.52 U	0.43 U	0.42 U
Mercury by Method SW-846 7471B (mg/kg)							
Mercury	0.73		**0.048**	0.013 U	0.014 U	0.012 U	0.010 U

Key:

Qualifiers

J = Estimated value

U = Not detected (method detection limit shown)

Other

mg/kg = milligrams per kilogram

"-FD" denotes field duplicate sample

Notes

1. Part 375-6.8(b) Restricted Use Soil Cleanup Objectives, for the Protection of Groundwater.
2. The SCO for total chromium was determined using New York State Department of Environmental Conservation, DER-10 (NYSDEC 2010a)
3. Bold values denote positive hits.
4. Shaded cells exceed screening criteria.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-4 Summary of Positive Analytical Results for Potable Water Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

		Location ID:	PW-2	PW-2-FD	PW-2
		Sample Name:	PW-2A-EVENT8	PW-2A-EVENT8-FD	PW-2-EVENT8
		Address:	1338 Speonk-Riverhead Rd (BB&S Site)	1338 Speonk-Riverhead Rd (BB&S Site)	1338 Speonk-Riverhead Rd (BB&S Site)
		Date:	12/12/16	12/12/16	12/14/16
Analyte	Screening Criteria (1,2,3)	Notes			
Volatile Organic Compounds by Method E524.2 (µg/L)					
Chloroform	7		**0.20 J**	**0.20 J**	**0.20 J**
Chloromethane	5		0.074 U	0.074 U	**0.21 J**
Perfluorinated Compounds by Method E537-LL (ng/L)					
Perfluoroheptanoic acid (PFHpA)	N/A		**2.48**	**2.48**	**5.67**
Perfluorohexanesulfonic acid (PFHxS)	N/A		ND	ND	ND
Perfluorononanoic acid (PFNA)	N/A		ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	N/A		ND	ND	**2.60**
Perfluorooctanoic acid (PFOA)	N/A		**4.11**	**4.27**	**8.81**
Total PFOA and PFOS	70	G	**4.11**	**4.27**	**11.4**
Metals by Method SW-846 6010C (µg/L)					
Aluminum	N/A		**22.2 J**	**20.4 J**	7.4 U
Arsenic	10		**0.37 J**	0.32 U	0.32 U
Barium	1000		**33.6**	**33.1**	**32.1**
Calcium	N/A		**5640**	**5600**	**21500**
Copper	1300		**103**	**93.8**	**139**
Lead	15		**4.5**	**3.9**	**0.19 J**
Magnesium	35000	G	**3290 J**	**3270 J**	**3040 J**
Manganese	300		**12.2 J**	**11.9 J**	**27.7**
Nickel	100		**0.55 J**	**0.57 J**	**0.75 J**
Potassium	N/A		**383**	**385**	**425**
Sodium	20000		**18400**	**18700**	**18600**
Zinc	2000		**69.7**	**64.7**	**68.9**
Hexavalent Chromium by Method SW-846 7196A (µg/L)					
Chromium, Hexavalent	50		2.7 U	2.7 U	2.7 U
Mercury by Method SW-846 7470A (µg/L)					
Mercury	0.7		0.17 U	0.17 U	0.17 U

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

Table A-4 Summary of Positive Analytical Results for Potable Water Samples - Monitoring Event 8
BB&S Treated Lumber Site, Southhampton, New York

Key:

Qualifiers

J = Estimated value

U = Not detected (method detection limit shown)

Other

µg/L = Micrograms per liter

ng/L = nanograms per liter

G = Guidance value (no standard available)

N/A = Not regulated/no available criteria

"-FD" denotes field duplicate sample

ND results for PFCs are less than 2 ng/L

Notes

1. Lesser of the New York State Department of Environmental Conservation, Technical and Operational Guidance Series Memorandum #1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, 1998 (with updates), Class GA Groundwater Standards and Guidance Values AND New York State Department of Health (NYSDOH), November 2011, Compilation of Codes, Rules, and Regulations of the State of New York. Title 10, Chapter 1, State Sanitary Code, Part 5, Drinking Water Supplies, Subpart 5-1, Public Water Systems.

2. Lead and copper action levels are based on calculations from multiple end-point samples per 10 NYCRR Section 5-1.41.

3. Per the NYSDOH Part 5 Drinking Water Standards (NYSDOH 2011), if iron and manganese are present, the total concentration of both should not exceed 500 µg/L.

2. Bold values denote positive hits.

3. Highlighted cells exceed screening criteria.

Key at end of table.

Source: Ecology and Environment Engineering, P.C. 2017

B

Cost Estimates for Alternatives

Table B-1 Summary of Total Present Values of Alternatives at the BB&S Site

Description	Alternative 1	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 2d	Alternative 2e
	Annual Sampling, Current MW Network	Annual Sampling, No MW-5	Annual Sampling, Replace BB&S-1 with identical well	Annual Sampling, Replace BB&S-1 with nested well	Annual Sampling, No MW-5, Replace BB&S-1 with identical well	Annual Sampling, No MW-5, Replace BB&S-1 with nested well
Capital Cost	$16,000	$17,000	$21,000	$27,000	$22,000	$27,000
Annual Costs [1]	$1,261,000	$1,246,000	$1,261,000	$1,292,000	$1,246,000	$1,276,000
Periodic Costs [2]	$145,000	$145,000	$145,000	$145,000	$145,000	$145,000
2017 Total Present Value of Alternative[3]	**$1,422,000**	**$1,408,000**	**$1,427,000**	**$1,464,000**	**$1,413,000**	**$1,448,000**

Description	Alternative 3	Alternative 4a	Alternative 4b	Alternative 4c	Alternative 4d	Alternative 4e
	Annual/Triennial Sampling, Current MW network	Annual/Triennial Sampling, No MW-5	Annual/Triennial Sampling, Replace BB&S-1 with identical well	Annual/Triennial Sampling, Replace BB&S-1 with nested well	Annual/Triennial Sampling, No MW-5, Replace BB&S-1 with identical well	Annual/Triennial Sampling, No MW-5, Replace BB&S-1 with nested well
Capital Cost	$16,000	$17,000	$21,000	$27,000	$19,000	$27,000
Annual Costs [1]	$792,000	$777,000	$792,000	$821,000	$792,000	$821,000
Periodic Costs [2]	$318,000	$318,000	$318,000	$318,000	$318,000	$318,000
2017 Total Present Value of Alternative[3]	**$1,126,000**	**$1,112,000**	**$1,131,000**	**$1,166,000**	**$1,129,000**	**$1,166,000**

Notes:

1 - Annual costs include site restoration, construction oversight, sampling, site inspections and monitoring event reporting for all alternatives. Sampling includes the current environmental monitoring network for Alternatives 1 and 2 and a reduced network for Alternatives 3 and 4.

2 - Periodic costs include 3-year periodic review reporting and 5-year well maintenance for all alternatives, as well as sampling the complete environmental monitoring network for Alternatives 3 and 4.

3 - The Total Present value of Alternative represents the estimated present value of the capital costs and annual and periodic costs throughout a 30-year timeframe.

Key:

BB&S = Best Building and Supply
MW = monitoring well
NYSDEC = New York State Department of Environmental Conservation
OM&M = operations, maintenance, and monitoring

Table B-2: Cost Estimate for Alternative 1 Annual Sampling, Current MW Network
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$322.17	$300
Subtotal					$300
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
			Capital Cost Subtotal:		$10,200
	Adjusted Capital Cost Subtotal for Riverhead, New York Location Factor (1.227):				$12,500
	10% Legal, administrative, engineering fees, construction management:				$1,300
			15% Contingencies:		$2,100
			Total Capital Cost:		**$16,000**
Annual Costs					
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Complete well, sediment, SW, potable water sampling	Assume 37 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, office support, equipment included	Event	1	$21,529.20	$21,500
Sample Analysis	Assume 37 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$7,183.07	$7,200
Monitoring Event reporting	Written after every monitoring event	Event	1	$17,000.00	$17,000
Waste Water Disposal	Characterized in sample analysis, assume ten 55 gallon drums per full monitoring event	Drum	10	$240.00	$2,400
Subtotal					$52,800
			Annual Cost Subtotal:		$52,800
	Adjusted Capital Cost Subtotal for Riverhead, New York Location Factor (1.227):				$64,800
		10% Legal, administrative, engineering fees:			$6,500
			15% Contingencies:		$10,700
			Annual Cost Total:		**$82,000**
		30-Year Present Value of Annual Costs:			**$1,261,000**
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Subtotal					$16,000
3-Year Cost Subtotal:					$16,000
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$19,600
10% Legal, administrative, engineering fees:					$2,000
15% Contingencies:					$3,200
3-Year Total:					**$24,800**
30-Year Present Value of 3-Year Costs:					**$140,000**

Table B-2: Cost Estimate for Alternative 1 Annual Sampling, Current MW Network
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,422,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-3: Cost Estimate for Alternative 2a Annual Sampling, Decommission MW-5
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$322.17	$322
Subtotal					$300
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission MW-5	Well depth 24.92'	LF	25	$14.75	$400
Subtotal					$400
				Capital Cost Subtotal:	$10,600
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$13,000
	10% Legal, administrative, engineering fees, construction management:				$1,300
				15% Contingencies:	$2,100
				Total Capital Cost:	**$17,000**
Annual Costs					
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Complete well, sediment, SW, potable water sampling	Assume 36 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, office support, equipment included	Event	1	$20,996.20	$21,000
Sample Analysis	Assume 36 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$7,060.68	$7,100
Monitoring Event reporting	Written after every monitoring event	Event	1	$17,000.00	$17,000
Waste Water Disposal	Characterized in sample analysis, assume ten 55 gallon drums per full monitoring event	Drum	10	$240.00	$2,400
Subtotal					$52,200
				Annual Cost Subtotal:	$52,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$64,000
		10% Legal, administrative, engineering fees:			$6,400
				15% Contingencies:	$10,600
				Annual Cost Total:	**$81,000**
		30-Year Present Value of Annual Costs:			**$1,246,000**

Table B-3: Cost Estimate for Alternative 2a Annual Sampling, Decommission MW-5
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Subtotal					$16,000
3-Year Cost Subtotal:					$16,000
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$19,600
10% Legal, administrative, engineering fees:					$2,000
15% Contingencies:					$3,200
3-Year Total:					**$24,800**
30-Year Present Value of 3-Year Costs:					**$140,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,408,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-4: Cost Estimate for Alternative 2b Annual Sampling, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$416.54	$400
Subtotal					$400
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission BB&S-1	Well depth 77.24'	LF	77	$14.75	$1,100
Install BB&S-1	Replace with identical well, depth 77', diameter 2"	Well	1	$1,821.00	$1,800
Subtotal					$2,900
			Capital Cost Subtotal:		$13,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$16,200
	10% Legal, administrative, engineering fees, construction management:				$1,600
			15% Contingencies:		$2,700
			Total Capital Cost:		**$21,000**
Annual Costs					
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Complete well, sediment, SW, potable water sampling	Assume 37 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, office support, equipment included	Event	1	$21,529.20	$21,500
Sample Analysis	Assume 37 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$7,183.07	$7,200
Monitoring Event reporting	Written after every monitoring event	Event	1	$17,000.00	$17,000
Waste Water Disposal	Characterized in sample analysis, assume ten 55 gallon drums per full monitoring event	Drum	10	$240.00	$2,400
Subtotal					$52,800
			Annual Cost Subtotal:		$52,800
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$64,800
		10% Legal, administrative, engineering fees:			$6,500
			15% Contingencies:		$10,700
			Annual Cost Total:		**$82,000**
		30-Year Present Value of Annual Costs:			**$1,261,000**

Table B-4: Cost Estimate for Alternative 2b Annual Sampling, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Subtotal					$16,000
3-Year Cost Subtotal:					$16,000
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$19,600
10% Legal, administrative, engineering fees:					$2,000
15% Contingencies:					$3,200
3-Year Total:					**$24,800**
30-Year Present Value of 3-Year Costs:					**$140,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,427,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-5: Cost Estimate for Alternative 2c Annual Sampling, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$536.95	$500
Subtotal					$500
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission BB&S-1	Well depth 77.24'	LF	77	$14.75	$1,100
Install BB&S-1	Replace with nested well, depths 50', 77', 115', diameter 2" each, includes drilling	Nested Well	1	$5,463.00	$5,500
Subtotal					$6,600
			Capital Cost Subtotal:		$17,000
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$20,900
	10% Legal, administrative, engineering fees, construction management:				$2,100
			15% Contingencies:		$3,500
			Total Capital Cost:		**$27,000**
Annual Costs					
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Complete well, sediment, SW, potable water sampling	Assume 39 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, office support, equipment included	Event	1	$22,595.20	$22,600
Sample Analysis	Assume 39 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$7,427.85	$7,400
Monitoring Event reporting	Written after every monitoring event	Event	1	$17,000.00	$17,000
Waste Water Disposal	Characterized in sample analysis, assume ten 55 gallon drums per full monitoring event	Drum	10	$240.00	$2,400
Subtotal					$54,100
			Annual Cost Subtotal:		$54,100
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$66,400
		10% Legal, administrative, engineering fees:			$6,600
			15% Contingencies:		$11,000
			Annual Cost Total:		**$84,000**
		30-Year Present Value of Annual Costs:			**$1,292,000**

Table B-5: Cost Estimate for Alternative 2c Annual Sampling, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Subtotal					$16,000
3-Year Cost Subtotal:					$16,000
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$19,600
10% Legal, administrative, engineering fees:					$2,000
15% Contingencies:					$3,200
3-Year Total:					**$24,800**
30-Year Present Value of 3-Year Costs:					**$140,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,464,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-6: Cost Estimate for Alternative 2d Annual Sampling, Decommission MW-5, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$429.56	$400
Subtotal					$400
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission BB&S-1 and MW-5	MW-5 24.92' deep, BB&S-1 77.24' deep	LF	102	$14.75	$1,500
Install BB&S-1	Replace with identical well, depth 77', diameter 2"	Well	1	$1,821.00	$1,800
Subtotal					$3,300
			Capital Cost Subtotal:		$13,600
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$16,700
	10% Legal, administrative, engineering fees, construction management:				$1,700
			15% Contingencies:		$2,800
			Total Capital Cost:		**$22,000**
Annual Costs					
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Complete well, sediment, SW, potable water sampling	Assume 36 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, office support, equipment included	Event	1	$20,996.20	$21,000
Sample Analysis	Assume 36 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$7,060.68	$7,100
Monitoring Event reporting	Written after every monitoring event	Event	1	$17,000.00	$17,000
Waste Water Disposal	Characterized in sample analysis, assume ten 55 gallon drums per full monitoring event	Drum	10	$240.00	$2,400
Subtotal					$52,200
			Annual Cost Subtotal:		$52,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$64,000
		10% Legal, administrative, engineering fees:			$6,400
			15% Contingencies:		$10,600
			Annual Cost Total:		**$81,000**
		30-Year Present Value of Annual Costs:			**$1,246,000**

Table B-6: Cost Estimate for Alternative 2d Annual Sampling, Decommission MW-5, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Subtotal					$16,000
3-Year Cost Subtotal:					$16,000
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$19,600
10% Legal, administrative, engineering fees:					$2,000
15% Contingencies:					$3,200
3-Year Total:					**$24,800**
30-Year Present Value of 3-Year Costs:					**$140,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,413,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-7: Cost Estimate for Alternative 2e Annual Sampling, Decommission MW-5, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$549.96	$500
Subtotal					$500
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission BB&S-1 and MW-5	MW-5 24.92' deep, BB&S-1 77.24' deep	LF	102	$14.75	$1,500
Install BB&S-1	Replace with nested well, depths 50', 77', 115', diameter 2" each, includes drilling	Nested Well	1	$5,463.00	$5,500
Subtotal					$7,000
				Capital Cost Subtotal:	$17,400
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$21,300
	10% Legal, administrative, engineering fees, construction management:				$2,100
				15% Contingencies:	$3,500
				Total Capital Cost:	**$27,000**
Annual Costs					
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Complete well, sediment, SW, potable water sampling	Assume 38 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, office support, equipment included	Event	1	$22,062.20	$22,100
Sample Analysis	Assume 38 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$7,305.46	$7,300
Monitoring Event reporting	Written after every monitoring event	Event	1	$17,000.00	$17,000
Waste Water Disposal	Characterized in sample analysis, assume ten 55 gallon drums per full monitoring event	Drum	10	$240.00	$2,400
Subtotal					$53,500
				Annual Cost Subtotal:	$53,500
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$65,600
		10% Legal, administrative, engineering fees:			$6,600
				15% Contingencies:	$10,800
				Annual Cost Total:	**$83,000**
		30-Year Present Value of Annual Costs:			**$1,276,000**

Table B-7: Cost Estimate for Alternative 2e Annual Sampling, Decommission MW-5, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Subtotal					$16,000
				3-Year Cost Subtotal:	$16,000
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$19,600
				10% Legal, administrative, engineering fees:	$2,000
				15% Contingencies:	$3,200
				3-Year Total:	**$24,800**
				30-Year Present Value of 3-Year Costs:	**$140,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
				5-Year Cost Subtotal:	$800
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$1,000
				10% Legal, administrative, engineering fees:	$100
				15% Contingencies:	$200
				5-Year Total:	**$1,300**
				30-Year Present Value of 5-Year Costs:	**$5,000**
				2017 Total Present Value Cost:	**$1,448,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-8: Cost Estimate for Alternative 3 Annual/Triennial Sampling, Current MW Network
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$322.17	$300
Subtotal					$300
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
			Capital Cost Subtotal:		$10,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$12,500
	10% Legal, administrative, engineering fees, construction management:				$1,300
			15% Contingencies:		$2,100
			Total Capital Cost:		**$16,000**
Annual Costs					
Partial well, sediment, SW, potable water sampling	Assume 2 people plus office support. 17 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, equipment included	Event	1	$10,867.00	$10,900
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Sample Analysis	Assume 17 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$4,387.07	$4,400
Monitoring Event reporting	Written after every monitoring event	Event	1	$12,000.00	$12,000
Waste Water Disposal	Characterized in sample analysis, assume five 55 gallon drums per reduced monitoring event	Drum	5	$240.00	$1,200
Subtotal					$33,200
			Annual Cost Subtotal:		$33,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$40,700
		10% Legal, administrative, engineering fees:			$4,100
			15% Contingencies:		$6,700
			Annual Cost Total:		**$51,500**
		30-Year Present Value of Annual Costs:			**$792,000**

Table B-8: Cost Estimate for Alternative 3 Annual/Triennial Sampling, Current MW Network
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Complete well, sediment, SW, potable water sampling	Assume 20 wells sampled (in addition to annual sampling), office support, equipment included	Event	1	$10,662.00	$10,700
Sample Analysis	Assume 20 wells (in addition to annual sampling) analyzed for metals	Event	1	$2,796.00	$2,800
Waste Water Disposal	Characterized in sample analysis, assume five additional 55 gallon drums per full monitoring event (10 drums total)	Drum	5	$240.00	$1,200
Monitoring Event reporting	Additional cost for increase in sampling effort	Event	1	$5,000.00	$5,000
Subtotal					$35,700
				3-Year Cost Subtotal:	$35,700
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$43,800
				10% Legal, administrative, engineering fees:	$4,400
				15% Contingencies:	$7,200
				3-Year Total:	**$55,400**
				30-Year Present Value of 3-Year Costs:	**$313,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
				5-Year Cost Subtotal:	$800
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$1,000
				10% Legal, administrative, engineering fees:	$100
				15% Contingencies:	$200
				5-Year Total:	**$1,300**
				30-Year Present Value of 5-Year Costs:	**$5,000**
				2017 Total Present Value Cost:	**$1,126,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-9: Cost Estimate for Alternative 4a Annual/Triennial Sampling, Decommission MW-5
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$335.18	$300
Subtotal					$300
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission MW-5	Well depth 24.92'	LF	25	$14.75	$400
Subtotal					$400
			Capital Cost Subtotal:		$10,600
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$13,000
	10% Legal, administrative, engineering fees, construction management:				$1,300
			15% Contingencies:		$2,100
			Total Capital Cost:		**$17,000**
Annual Costs					
Partial well, sediment, SW, potable water sampling	Assume 2 people plus office support. 16 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, equipment included	Event	1	$10,334.00	$10,300
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Sample Analysis	Assume 16 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$4,264.68	$4,300
Monitoring Event reporting	Written after every monitoring event	Event	1	$12,000.00	$12,000
Waste Water Disposal	Characterized in sample analysis, assume five 55 gallon drums per reduced monitoring event	Drum	5	$240.00	$1,200
Subtotal					$32,500
			Annual Cost Subtotal:		$32,500
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$39,900
		10% Legal, administrative, engineering fees:			$4,000
			15% Contingencies:		$6,600
			Annual Cost Total:		**$50,500**
		30-Year Present Value of Annual Costs:			**$777,000**

Table B-9: Cost Estimate for Alternative 4a Annual/Triennial Sampling, Decommission MW-5
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Complete well, sediment, SW, potable water sampling	Assume 20 wells sampled (in addition to annual sampling), office support, equipment included	Event	1	$10,662.00	$10,700
Sample Analysis	Assume 20 wells (in addition to annual sampling) analyzed for metals	Event	1	$2,796.00	$2,800
Waste Water Disposal	Characterized in sample analysis, assume five additional 55 gallon drums per full monitoring event (10 drums total)	Drum	5	$240.00	$1,200
Monitoring Event reporting	Additional cost for increase in sampling effort	Event	1	$5,000.00	$5,000
Subtotal					$35,700
				3-Year Cost Subtotal:	$35,700
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$43,800
				10% Legal, administrative, engineering fees:	$4,400
				15% Contingencies:	$7,200
				3-Year Total:	**$55,400**
				30-Year Present Value of 3-Year Costs:	**$313,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
				5-Year Cost Subtotal:	$800
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$1,000
				10% Legal, administrative, engineering fees:	$100
				15% Contingencies:	$200
				5-Year Total:	**$1,300**
				30-Year Present Value of 5-Year Costs:	**$5,000**
				2017 Total Present Value Cost:	**$1,112,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-10: Cost Estimate for Alternative 4b Annual/Triennial Sampling, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$416.54	$400
Subtotal					$400
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission BB&S-1	Well depth 77.24'	LF	77	$14.75	$1,100
Replace BB&S-1	Replace with identical well, depth 77', diameter 2"	Well	1	$1,821.00	$1,800
Subtotal					$2,900
				Capital Cost Subtotal:	$13,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$16,200
	10% Legal, administrative, engineering fees, construction management:				$1,600
				15% Contingencies:	$2,700
				Total Capital Cost:	**$21,000**
Annual Costs					
Partial well, sediment, SW, potable water sampling	Assume 2 people plus office support. 17 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, equipment included	Event	1	$10,867.00	$10,900
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Sample Analysis	Assume 17 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$4,387.07	$4,400
Monitoring Event reporting	Written after every monitoring event	Event	1	$12,000.00	$12,000
Waste Water Disposal	Characterized in sample analysis, assume five 55 gallon drums per reduced monitoring event	Drum	5	$240.00	$1,200
Subtotal					$33,200
				Annual Cost Subtotal:	$33,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$40,700
		10% Legal, administrative, engineering fees:			$4,100
				15% Contingencies:	$6,700
				Annual Cost Total:	**$51,500**
		30-Year Present Value of Annual Costs:			**$792,000**

Table B-10: Cost Estimate for Alternative 4b Annual/Triennial Sampling, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000.00	$16,000
Complete well, sediment, SW, potable water sampling	Assume 20 wells sampled (in addition to annual sampling), office support, equipment included	Event	1	$10,662.00	$10,700
Sample Analysis	Assume 20 wells (in addition to annual sampling) analyzed for metals	Event	1	$2,796.00	$2,800
Waste Water Disposal	Characterized in sample analysis, assume five additional 55 gallon drums per full monitoring event (10 drums total)	Drum	5	$240.00	$1,200
Monitoring Event reporting	Additional cost for increase in sampling effort	Event	1	$5,000.00	$5,000
Subtotal					$35,700
3-Year Cost Subtotal:					$35,700
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$43,800
10% Legal, administrative, engineering fees:					$4,400
15% Contingencies:					$7,200
3-Year Total:					**$55,400**
30-Year Present Value of 3-Year Costs:					**$313,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,131,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-11: Cost Estimate for Alternative 4c Annual/Triennial Sampling, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$536.95	$500
Subtotal					$500
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission BB&S-1	Well depth 77.24'	LF	77	$14.75	$1,100
Replace BB&S-1	Replace with nested well, depths 50', 77', 115', diameter 2" each, includes drilling	Nested Well	1	$5,463.00	$5,500
Subtotal					$6,600
			Capital Cost Subtotal:		$17,000
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$20,900
	10% Legal, administrative, engineering fees, construction management:				$2,100
			15% Contingencies:		$3,500
			Total Capital Cost:		**$27,000**
Annual Costs					
Partial well, sediment, SW, potable water sampling	Assume 2 people plus office support. 19 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, equipment included	Event	1	$11,933.00	$11,900
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Sample Analysis	Assume 19 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$4,631.85	$4,600
Monitoring Event reporting	Written after every monitoring event	Event	1	$12,000.00	$12,000
Waste Water Disposal	Characterized in sample analysis, assume five 55 gallon drums per reduced monitoring event	Drum	5	$240.00	$1,200
Subtotal					$34,400
			Annual Cost Subtotal:		$34,400
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$42,200
		10% Legal, administrative, engineering fees:			$4,200
			15% Contingencies:		$7,000
			Annual Cost Total:		**$53,400**
		30-Year Present Value of Annual Costs:			**$821,000**

Table B-11: Cost Estimate for Alternative 4c Annual/Triennial Sampling, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000	$16,000
Complete well, sediment, SW, potable water sampling	Assume 20 wells sampled (in addition to annual sampling), office support, equipment included	Event	1	$10,662.00	$10,700
Sample Analysis	Assume 20 wells (in addition to annual sampling) analyzed for metals	Event	1	$2,796.00	$2,800
Waste Water Disposal	Characterized in sample analysis, assume five additional 55 gallon drums per full monitoring event (10 drums total)	Drum	5	$240.00	$1,200
Monitoring Event reporting	Additional cost for increase in sampling effort	Event	1	$5,000.00	$5,000
Subtotal					$35,700
3-Year Cost Subtotal:					$35,700
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$43,800
10% Legal, administrative, engineering fees:					$4,400
15% Contingencies:					$7,200
3-Year Total:					**$55,400**
30-Year Present Value of 3-Year Costs:					**$313,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,166,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-12: Cost Estimate for Alternative 4d Annual/Triennial Sampling, Decommission MW-5, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$370.98	$400
Subtotal					$400
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission MW-5 and BB&S-1	MW-5 24.92' deep, BB&S-1 77.24' deep	LF	102	$14.75	$1,500
Replace BB&S-1	Replace with identical well, depth 77', diameter 2"	Well	1	$1,821.00	$1,800
Subtotal					$1,500
			Capital Cost Subtotal:		$11,800
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$14,500
	10% Legal, administrative, engineering fees, construction management:				$1,500
			15% Contingencies:		$2,400
			Total Capital Cost:		**$19,000**
Annual Costs					
Partial well, sediment, SW, potable water sampling	Assume 2 people plus office support. 17 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, equipment included	Event	1	$10,867.00	$10,900
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Sample Analysis	Assume 17 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$4,387.07	$4,400
Monitoring Event reporting	Written after every monitoring event	Event	1	$12,000.00	$12,000
Waste Water Disposal	Characterized in sample analysis, assume five 55 gallon drums per reduced monitoring event	Drum	5	$240.00	$1,200
Subtotal					$33,200
			Annual Cost Subtotal:		$33,200
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$40,700
		10% Legal, administrative, engineering fees:			$4,100
			15% Contingencies:		$6,700
			Annual Cost Total:		**$51,500**
		30-Year Present Value of Annual Costs:			**$792,000**

Table B-12: Cost Estimate for Alternative 4d Annual/Triennial Sampling, Decommission MW-5, Replace BB&S-1 with identical well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000	$16,000
Complete well, sediment, SW, potable water sampling	Assume 20 wells sampled (in addition to annual sampling), office support, equipment included	Event	1	$10,662.00	$10,700
Sample Analysis	Assume 20 wells (in addition to annual sampling) analyzed for metals	Event	1	$2,796.00	$2,800
Waste Water Disposal	Characterized in sample analysis, assume five additional 55 gallon drums per full monitoring event (10 drums total)	Drum	5	$240.00	$1,200
Monitoring Event reporting	Additional cost for increase in sampling effort	Event	1	$5,000.00	$5,000
Subtotal					$35,700
3-Year Cost Subtotal:					$35,700
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$43,800
10% Legal, administrative, engineering fees:					$4,400
15% Contingencies:					$7,200
3-Year Total:					**$55,400**
30-Year Present Value of 3-Year Costs:					**$313,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
5-Year Cost Subtotal:					$800
Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):					$1,000
10% Legal, administrative, engineering fees:					$100
15% Contingencies:					$200
5-Year Total:					**$1,300**
30-Year Present Value of 5-Year Costs:					**$5,000**
2017 Total Present Value Cost:					**$1,129,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
CCA = chromated copper arsenate
EA = each
HDPE = high density polyethylene
LF = linear foot
LS = lump sum
MW = monitoring well
SF = square foot
SW = surface water
VOC = volatile organic compound

Table B-13: Cost Estimate for Alternative 4e Annual/Triennial Sampling, Decommission MW-5, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
Capital Costs					
Construction Management (2.5% of total capital cost)	Includes submittals, reporting	LS	1	$549.96	$500
Subtotal					$500
Site Restoration					
Former CCA Treatment Building liner installation	Assume 40-mil HDPE liner in place of epoxy paint, includes labor and material	SF	3,810	$1.02	$3,900
Site Fence Repairs	Assume south side and southwest corner only	LF	400	$15.00	$6,000
Subtotal					$9,900
Well Network Improvements					
Decommission MW-5 and BB&S-1	MW-5 24.92' deep, BB&S-1 77.24' deep	LF	102	$14.75	$1,500
Replace BB&S-1	Replace with nested well, depths 50', 77', 115', diameter 2" each, includes drilling	Nested Well	1	$5,463.00	$5,500
Subtotal					$7,000
			Capital Cost Subtotal:		$17,400
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$21,300
	10% Legal, administrative, engineering fees, construction management:				$2,100
			15% Contingencies:		$3,500
			Total Capital Cost:		**$27,000**
Annual Costs					
Partial well, sediment, SW, potable water sampling	Assume 2 people plus office support. 19 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, equipment included	Event	1	$11,933.00	$11,900
Monitoring Event Oversight	Assume 4 days regardless of event, 1 person plus office support, traveling from Buffalo, New York	Event	1	$4,655.80	$4,700
Sample Analysis	Assume 19 wells sampled, 5 sediment samples, 2 potable water samples, 9 surface water samples, all samples analyzed for metals	Event	1	$4,631.85	$4,600
Monitoring Event reporting	Written after every monitoring event	Event	1	$12,000.00	$12,000
Waste Water Disposal	Characterized in sample analysis, assume five 55 gallon drums per reduced monitoring event	Drum	5	$240.00	$1,200
Subtotal					$34,400
			Annual Cost Subtotal:		$34,400
	Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):				$42,200
		10% Legal, administrative, engineering fees:			$4,200
			15% Contingencies:		$7,000
			Annual Cost Total:		**$53,400**
		30-Year Present Value of Annual Costs:			**$821,000**

Table B-13: Cost Estimate for Alternative 4e Annual/Triennial Sampling, Decommission MW-5, Replace BB&S-1 with nested well
BB&S Treated Lumber Corporation Site, Southampton, New York

Item Description	Comment	Unit	Quantity	Unit Cost	Cost
3-Year Costs					
Periodic Review Reporting	Performed triennially	3-year	1	$16,000	$16,000
Complete well, sediment, SW, potable water sampling	Assume 20 wells sampled (in addition to annual sampling), office support, equipment included	Event	1	$10,662.00	$10,700
Sample Analysis	Assume 20 wells (in addition to annual sampling) analyzed for metals	Event	1	$2,796.00	$2,800
Waste Water Disposal	Characterized in sample analysis, assume five additional 55 gallon drums per full monitoring event (10 drums total)	Drum	5	$240.00	$1,200
Monitoring Event reporting	Additional cost for increase in sampling effort	Event	1	$5,000.00	$5,000
Subtotal					$35,700
				3-Year Cost Subtotal:	$35,700
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$43,800
				10% Legal, administrative, engineering fees:	$4,400
				15% Contingencies:	$7,200
				3-Year Total:	**$55,400**
				30-Year Present Value of 3-Year Costs:	**$313,000**
5-Year Costs					
Monitoring well repair	Assume 10% of wells require repairs every 5 years	EA	4	$200.00	$800
Subtotal					$800
				5-Year Cost Subtotal:	$800
				Adjusted Annual Cost Subtotal for Riverhead, New York Location Factor (1.227):	$1,000
				10% Legal, administrative, engineering fees:	$100
				15% Contingencies:	$200
				5-Year Total:	**$1,300**
				30-Year Present Value of 5-Year Costs:	**$5,000**
				2017 Total Present Value Cost:	**$1,166,000**

Assumptions:

1. Present value cost based on annual and periodic costs over: 30 years
2. Present value of costs assumes 5% annual interest rate.
3. Unit costs and adjustment factors listed were obtained from 2017 RS Means Cost Data, site-specific historical cost from the 2017 Periodic Review Report, and engineering judgement.
4. Length of fencing assumed south side of Site

Key:
BB&S = Best Building and Supply
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